STRATEGIC MARKET PERSPECTIVE

Open Systems and Electronic Commerce

EDI / Electronic Commerce Program

OPEN SYSTEMS
AND
ELECTRONIC COMMERCE

INPUT ®

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ED2

Abstract

Open systems and electronic commerce are two information systems
trends of the nineties. Software and technology vendors are providing
information systems that are made of interchangable components. Com-
panies are implementing network based systems that interconnect appli-
cations across company boundaries. The two trends mutually reinforce
one another. This report examines how open systems and electronic
commerce are reinforcing one another, what are the specific benefits of
open systems in building electronic commerce systems (with special
emphasis on conducting EDI in a UNIX environment), what lies in store
for the continuing development of open electronic commerce systems,
and how the vendor community will respond to and be changed by this
emerging opportunity.

The report is 76 pages long and contains 13 exhibits.

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(EDI)

Open Systems and Electronic Commerce

Table of Contents

Table of Contents (Continued)

Table of Contents (Continued)

Table of Contents (Continued)

Exhibits

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I

Introduction

This report examines how new software products (particularly network operating system software—UNIX and Microsoft NT) are generating new possibilities for companies to interconnect their respective computer systems and allow them to conduct commercial transactions electronically.

A
Scope of Report

Open systems, therefore in this context, refers to one or more of the following: (1) hardware and equipment that can be changed without changing the software, (2) software that can be changed without changing the hardware/equipment, and/or (3) interoperability between multiple systems.

Electronic commerce refers to the use of an intercompany electronic network by which companies transmit the communications inherent to a commercial transaction.

Today, electronic commerce technologies are manifold: there is credit card processing, various kinds of electronic information services (credit data bases, for example), industry-specific buy-sell systems (such as an airline reservation system).

This report concentrates on one technology of electronic commerce: electronic data interchange. EDI is the exchange of business data in structured, standardized formats between independent computer systems at companies. EDI represents all electronic commerce in this report because:

- Today's EDI standard data formats represent (albeit inefficiently) the essential business communications of a commercial trade (purchase order data, invoice data, etc.).

- EDI has long been the cornerstone of electronic commerce.

Likewise, we consider UNIX as the proxy of open systems. Open system architecture is an ideal (as yet attained), and the UNIX operating system is currently the closest thing that approximates an open system.

Therefore, while this report may be more precisely entitled, "UNIX and EDI," we used these two specific instances of their respective supercategories to generalize for a wider phenomenon and, thus, call the report, "Open Systems and Electronic Commerce."

B

The Premise: Open Systems and EDI are an Ideal Fit

Open systems thinking and EDI fit naturally. Both aim to interconnect and provide interoperability in heterogeneous computing environments.

- EDI provides interoperability on an application-to-application level. It allows the data output of one independent computer process to automatically be inputted into another independent computer process.

- An open systems architecture provides interoperability on a systems software-to-hardware level. It allows a single systems environment to be established on any brand of hardware.

EDI and open systems, therefore, comprehensively provide interoperability to users: on a systems level and on an applications level. The benefits of interoperability and distributed processing (e.g. hardware independence, flexibility, cost-effectiveness, etc.) should somehow be compounded by this double dimension of interoperability. Exhibit III-1 graphically depicts the two dimensions of interoperability that EDI and open systems bring to a computing environment.

EXHIBIT I-1

The Two Dimensions of Interoperability

Application-to-application
interoperability supported
by EDI

Application
A

Application
B

Equipment
Platform

Application-to-system
interoperability supported
by open systems
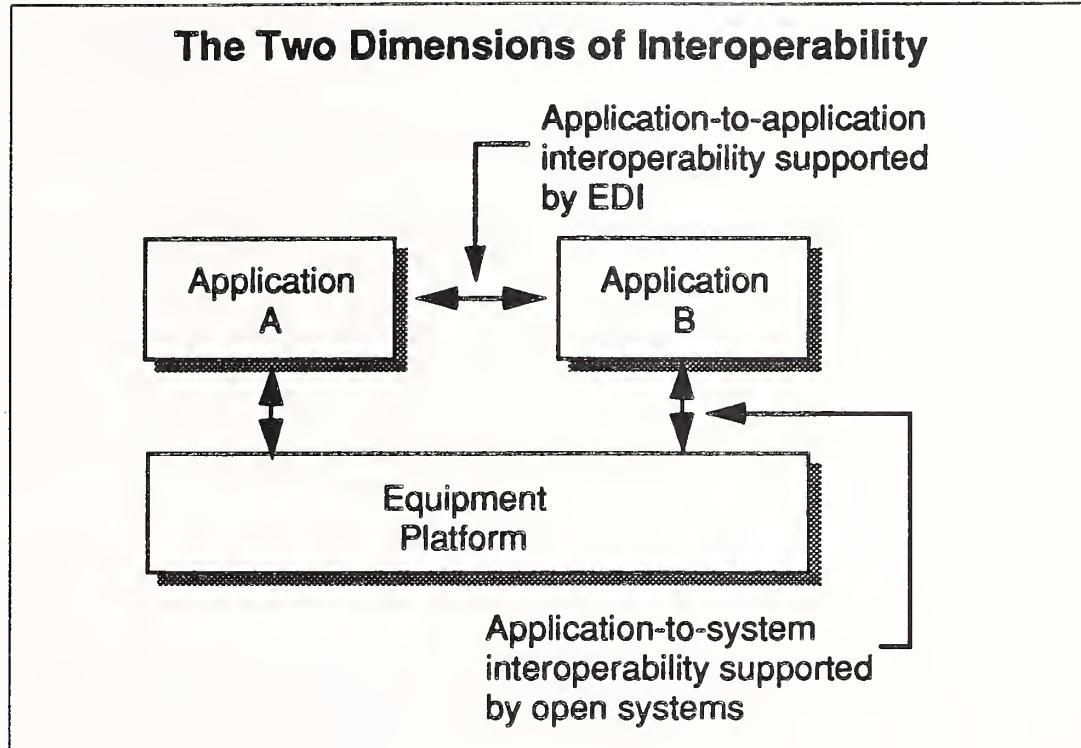
C
Methodology

INPUT conducted an in-depth survey of 11 companies that have adopted
UNIX platforms upon which to conduct EDI. The benefits and experi-
ences gained from this are summarized and analyzed.

The report focuses on the qualitative shift in the manner in which
electronic commerce is implemented and identifies common conclusions.

D
Related INPUT Reports

This report is part of INPUT's EDI/Electronic Commerce strategy and
market advisory program. The program provides users and vendors of EDI
and electronic commerce systems with strategy consulting in how to price,
package, and sell their market offerings in an electronic commerce envi-
ronment. Services are delivered through on-site consulting, personal
advising, and competitive intelligence hotline over the telephone, newslet-
ters, and reports.

The following reports are recent titles published by the program:

Electronic Commerce: The New Foundation for Trade
Electronic Commerce in the Media Industry
Electronic Commerce in U.S. Health Care
Electronic Commerce in Trade and Transportation
Electronic Commerce in Travel and Tourism
Electronic Commerce in Grocery Production and Distribution
Electronic Commerce in Apparel Production and Distribution
Electronic Commerce in the U.S. Federal Government
Electronic Commerce: Comprehensive Market Assessment
Integrated Electronic Messaging: Trends, Issues, Opportunities
Opportunities in Electronic Payments
International EDI Markets, 1992-1997
The U.S. Electronic Data Interchange Market, 1992-1997
EDI in Europe, 1990
The EDI Market in Japan, 1992-1997
Developments in Corporate Electronic Trade Payments
EDI Business Integration Issues

Contact any INPUT office or call our California office at 415-961-3300 for more details (8 a.m. to 5 p.m. Pacific Daylight Time) on any of these reports.

II
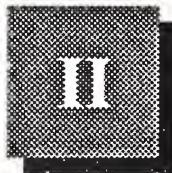
Executive Overview

A
Background

For 25 years, electronic data interchange (EDI) has been the flagship technology for electronic commerce, which is the electronic, instead of paper method of conducting business transactions. Likewise, for 25 years, EDI has been minimally implemented and, consequently, the dream of electronic commerce—doing business without paper—has never been fully realized.

The architecture and design objectives of EDI share the same theoretic goals of open systems: that is, interoperability among different computer software applications. But these objectives have not been realized. In fact, just the opposite has been true. For the past quarter of a century, EDI, in its actual empirical implementations, has tended more toward a proprietary rather than an open architecture. Since its first implementations in the sixties, EDI has been platform-specific, application-specific, industry-specific, and customer/supplier-specific.

Due to the immense complexities and difficulties of implementing such closed systems, an entire industry comprised of EDI software and service providers has arisen. This industry is now generating $500 million dollars in revenues-per-year in the U.S. alone and $750 million dollars-per-year worldwide in sales. These numbers do not reflect the internal development expenses associated with EDI.

All of this is about to change. The movement by users to adopt open system architectures is about to sweep away today's EDI industry. Advancements in information technology (namely: the new operating systems of UNIX and Microsoft Windows NT, new software development tools for object-oriented programming and related CASE tools, and inexpensive mass market application software and equipment) are reshaping the competitive playing field for vendors of electronic commerce tools; including EDI software and service. The dream of electronic commerce is within reach, but those vendors who will make it happen may not be today's EDI vendors.

B

Definitions

Open system refers to one or more of the following: (1) hardware and equipment that can be changed without changing software; (2) software that can be changed without changing the hardware/equipment; and (3) interoperability between multiple systems.

Electronic commerce is the use of electronic network systems in order to conduct business transactions.

By these definitions, open systems and electronic commerce are inherently complementary and mutually supportive. Electronic commerce and its most visible technology manifestation, electronic data interchange, provide interoperability on an application-to-application level. Open systems architectures, provide interoperability on a systems software-to-hardware level. Therefore, electronic commerce and open systems provide interoperability to users on both systems and applications levels.

C

Benefits of Open Systems to Electronic Commerce

One technological manifestation of open systems, the UNIX operating system, brings distinctive advantages to companies building electronic commerce systems. These advantages are: (1) time-responsiveness to trading partners; (2) excellent internal-to-external information system integration features; (3) scalable processing power to support EDI volume expansions; (4) broad trading-partner communication alternatives, including the ability to communicate directly with trading partners and bypass third-party value-added networks; and (5) an equitable distribution of systems development costs among trading partners commensurate with the value each partner receives from the system.

D

Creating a Mass Market for Electronic Commerce

Three general user trends of adopting open systems and building EDI and other electronic commerce systems are combining to create an explosive growth in open electronic commerce systems: (1) downsizing, (2) the proliferation of computer systems into virtually every commercial enterprise and (3) the constant improvement of price/performance ratios for information systems (resulting from mass market software, sophisticated network operating systems, graphical user interfaces, CASE tools, and

object-oriented programming). These trends are opening up a new market: the mass electronic commerce market, where hundreds of thousands of companies will build interoperating systems that transcend company boundaries.

E
Technological Advancement Overturns the EDI Vendor Industry

The supply of open-system technologies from vendors and the demand for electronic commerce solutions from users is acting to remake the EDI and related information software and services industry. By incorporating EDI functionality —that is, file format translation—as a standard service in a network operating system, the EDI software vendor industry stands to be radically restructured. In addition, the communication benefits of the emerging network operating systems promise to allow companies to interconnect their applications directly and bypass value-added networks. Like the EDI software vendor, today's EDI network service provider also stands to have its competitive position challenged.

F
Competitive Environment

There are two groups of software and service vendors that can bring open systems to electronic commerce solutions: the network operating system software vendors and the EDI software and service vendors. The important players today from these two groups are Microsoft Corporation, Novell, Inc., Advantis, American Business Computer, Blue Rainbow Software International Corp., Electronic Data Systems Corporation, GE Information Services, Premenos, St. Paul Software, Sterling Software, Inc., Texas Instruments Incorporated, and TSI International. Each of these companies is, in one way or another, providing open electronic commerce technologies and/or solutions based on their respective competences, resources, and strategic perspectives.

G
The Open Electronic Commerce Scenario

As open systems software solutions for intercompany data exchange become widely adopted, the nature of the information technology production and deployment will engender these issues:

- User/vendor distinctions will blur. All companies will be located on a continuum ranging between line/equipment provider to service provider/reseller to single client-user.

- The definition of the "ownership" of the network will differ with its traditional meaning. It will no longer be important whether a company owns the physical lines or the box in which messages are stored and forwarded. More important will be who possesses the membership enrollment authority: the ability to sign up or keep out subscribers from a particular club/community of users.

H

Implications for Specific Electronic Commerce Parties

- *Value-added networks:* can still be viable but must bring *real*-added value. Mailboxing data is no longer a value-added service (because anyone with a PC and a pair of modems can do it). VANs will have to provide services unique to trading communities. To use the client/server framework, they will become mega-servers for a niche of clients. Competitors are not only other VANs but large hub companies that offer specific services (such as communication companies, publishers, media companies). Differentiation of service offering is the best competitive strategy, with emphasis on delivering vertical/industry-specific and application-specific expertise.

- *Software vendors:* should charge by the number of subscribers (or trading relationships) that use software. In other words, software will become a server in an extensive client/server universe of companies engaged in trade. The UNIX, EDI, and systems software vendors are already charging by the user.

- *Users:* should either join or establish a club. A small company should insure to belong to a community(ies). There will be some authority in charge of the community who will patronize its membership in the manner of a trade association, a large trading partner, a government agency, or a niche-specific service bureau, etc. A large company can become an authority by which it controls membership in a community of interest. A communication company, publisher, processing service company, etc., should strive to make vertical-market expertise available on a network. These latter companies can become "megaservers" on the ubiquitous electronic commerce network.
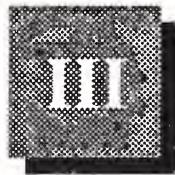
Survey Results

Key points:

- Many users adopt a UNIX environment specifically to enhance their ability in building EDI and electronic commerce systems.

- Open systems facilitate electronic commerce. In other words, there are specific benefits of UNIX and open systems unique to the intercompany exchange of data.

- In addition to enhanced electronic linkages with trading partners, open system architectures brought other benefits to companies.

- There are proprietary alternatives with which to build electronic commerce systems.

A

UNIX Adopted Specifically to Conduct EDI

As it was shown in chapter I, EDI and open systems are a natural fit. But do users see it this way? The answer is: YES.

In our limited sample size, one-out-of-three users adopted a Unix environment specifically to construct a new, more optimal EDI translation server (as depicted in Exhibit III-1).

A third of those interviewed for this study claimed that they adopted UNIX primarily to build or to enhance their EDI capability. The others responded that adopting UNIX was part of an overall corporate strategy for an IS architecture. The point of this statistic is that users perceive the natural affinity between UNIX and EDI. There are benefits to UNIX that are unique to intercompany data exchange.

EXHIBIT III-1

UNIX Adopted Specifically for EDI

33% Adopted
UNIX for EDI
purposes
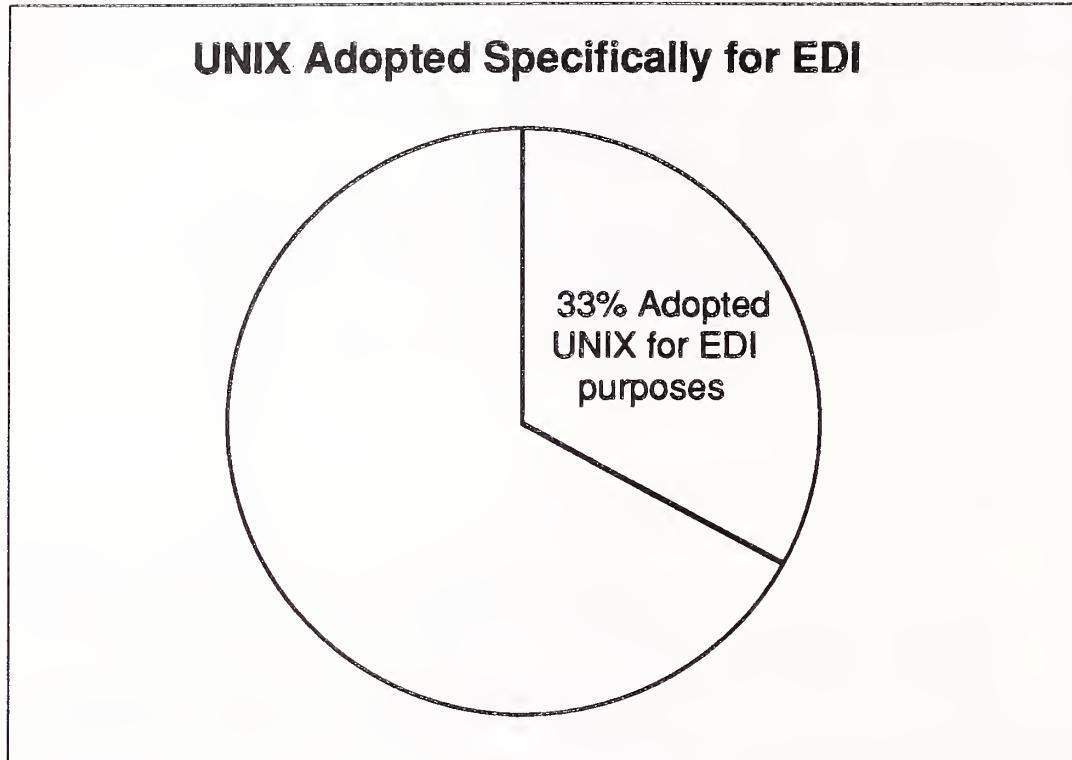
B

There are Open-Systems Benefits Unique to Inter-Company Data Exchange

UNIX and open systems architectures facilitate the creation of EDI and electronic commerce systems.

Another way of saying this is:

• EDI is a type of client/server architecture (one company's order-entry system is the server to another company's buying system; or, one company's accounts payable system is the server to another company's accounts receivable system).

• Because it is a client/server architecture to begin with, the implementation and operation of EDI and electronic commerce systems are naturally enhanced by open UNIX architectures.

While UNIX and the open-systems paradigm provide a spectrum of benefits to the builder of information systems (e.g. hardware independence, savings in daily operating expenses, etc.), they provide particular benefits that are singular to computing applications that involve data exchanges external to the company, such as where EDI is used (but not just limited to EDI either).

To summarize, the benefits that open systems bring to automating commercial data exchanges are:

• Customer satisfaction
• Responsiveness to market needs

Open systems allow for time-responsive customer communications. They provide for a variety of ways to exchange data and integrate systems across organizational boundaries.

Open systems architectures have flexibility to respond to changing market conditions. They are scalable and allow for changes in processing power corresponding to changes in levels of trade. New communication features can be added as needed. The open system architecture can be operated in parallel with existing proprietary systems if desired. (Note that some proprietary systems—such as the AS/400—are also highly scalable.)

The benefits unique to EDI are summarized in Exhibit III-2.

EXHIBIT III-2

Intercompany Benefits of Open Systems

• Time-responsive to trading partner

• Excellent internal-to-external IS integration

• Scalable MIPs power supports EDI volume expansion

• Broad trading-partner communication alternatives

• Equitable distribution of systems costs among trading partners

1. Time-Responsive to Trading Partner

UNIX allows for multitasking and on-the-fly invoking of applications. Processing of data need not happen in batches that are scheduled at predetermined times during the day. Processing in a client/server environment under UNIX proceeds in an event-driven manner: as soon as an application prepares a file (or series of files) that must be sent to the trading partner, the operating system facilitates this process. Operating in a client/ server mode under UNIX allowed the company to avoid the constraints of batch processing. Likewise, as EDI data was picked up from the mail box (or was directly sent to the company's translation server from a trading partner), it could immediately be sent to the appropriate application (e.g. order entry, accounts payable, etc.) for processing. All subsequent processing required to complete the business transaction can be executed at

the time of need, not according to a set schedule. The effect is to make information systems more time-responsive to trading-partner data transmissions (due to multitasking, distributed processing over many servers and event-driven environment). This was one of the chief benefits most commonly and adamantly cited by users. See cases #4, #5, #6, #7, and #10 (in Chapter IV).

2. Excellent Internal-to-External IS Integration

This is a variation on the benefit cited above. The scripting features, multitasking, and distributed processing of UNIX allowed for tighter and more streamlined linkages between the translation server function and specific applications. Operations associated with the old legacy environment, such as file reformatting routines, manual initiation of processes (namely, the EDI translator and communications box) by systems operators, and other minor data preparation routines, could become obsolete. In addition, UNIX had the ironical benefit of allowing IS personnel to retain certain legacy (proprietary) operations where they were appropriate. Two interviewees claimed that, in some cases, it was better to apply the philosophy, "if it ain't broke don't fix it", to the system. See cases #4, #5, #6, #7, #10, #11.

3. Scalable MIPs Power Supports EDI Volume Expansion

EDI, as well as any electronic system that supports the company's commerce with other companies, is open-ended in terms of volume throughput. In other words, as the company's business expands, so must the capacity for processing commercial trade data. There is no upper limit. Building EDI and electronic commerce systems that are easily scalable according to the level of transaction flow is a key benefit of open EDI systems. A number of cases interviewed cited the ease with which they were able to upgrade their hardware platforms in order to keep up with transaction volumes. This was accomplished via upgrading the specific processor/workstation that the EDI software resided on (in many cases, from a low-end IBM RS/6000 to a higher performance RS/6000 or Sequent 2000; from an NCR Tower to an NCR uniprocessor 3450 then to an NCR multiprocessor 3550). Another way to increase MIPs (millions of instructions per second—a common metric for processing speed) was to simply replace the microprocessor inside some of the workstations (for example, replacing the Intel -486 with an Intel Pentium chip). See cases #3, #7, #8, #10.

4. Broad Trading-Partner Communication Alternatives

The UNIX environment provided companies several options for exchanging data with trading partners that did not exist in the older proprietary environments. Some of the options merely related to the robust data communications features that are built into UNIX. Some cited the ability

to exchange data directly with trading partners (via TCP/IP, UUP, and other protocols) without using a value-added network (VAN). Bypassing the VAN allowed the companies to save money (see cases #1 and #4,). Other options available to users related to the data exchange that is possible when all parties are using the same system software. A number of technology manufacturers found that with their suppliers and customers using UNIX workstations, they could easily exchange CAD/CAM, product information files and specialized design software modules. Such exchanges obviously brought companies' respective production systems closer together (see cases #.1, #2). Finally, as cited in the first major advantage above, the event-driven nature of a UNIX environment (where a trading partner's data transmission could be immediately acted on, and not held in a batch queue for processing at a preset time of day) allowed for tighter, more coordinated communications with trading partners.

5. Equitable Distribution of Systems Costs Among Trading Partners

Another advantage over proprietary systems that UNIX and open systems architectures bring to EDI and electronic commerce is the minimizing and equal distribution of systems expenses. In the early proprietary order-entry systems, such as the pharmaceutical order-entry systems and the airline reservation systems, the supplier shouldered the entire development and maintenance cost of the system (including the terminal and linkages at the customer site). With an open architecture that consists of inexpensive and interchangeable parts, it is easier for trading partners to act autonomously and install and support their own equipment and systems. The result is that everyone shoulders an expense that is commensurate with the value they receive.

C

Other Benefits of UNIX/Open Systems Cited by Interviewees

Other benefits of open systems cited by users in this survey corroborated the popular notions of open systems: hardware independence, inexpensive and fast development/implementation cycles, and savings in daily operating expenses.

To summarize in a word, open systems enabled users to
OPTIMIZE INFORMATION TECHNOLOGY RESOURCES.

Specifically, the other benefits of open systems are listed below. They are grouped under two general areas relating to information technology business issues: development of systems and operation of systems. There are benefits of open systems in both areas.

1. System Development Benefits

System development refers to the building, modifying, and maintenance of information systems inside a company. While this area is of importance to any company that uses information systems, it is of special importance when those systems support commercial transactions.

Systems development is important here because the extreme variability of market conditions require great flexibility/plasticity in those systems that directly interface with those conditions. EDI and electronic commerce systems are precisely these systems. For this reason, systems development benefits could be considered along with those benefits that are unique to intercompany data exchanges in section C above. We consider them separately here as part of general benefits.

The benefits in systems development and maintenance cited by users in this survey are listed in Exhibit III-3

EXHIBIT III-3

Systems Development Benefits

- Inexpensive MIPS

- Interchangeable parts

- Easy to customize (once UNIX is learned)

- No need for expensive proprietary system experts

- No change in software when upgrading equipment

2. System Operations Benefits

In addition to the optimal way systems can be built and maintained, UNIX also brings optimal performance to systems operations. These are summarized in Exhibit III-4.

EXHIBIT III-4

Systems Operations Benefits

- More event-driven and responsive

- Better use of IS assets

- Less need for manual system-operator tasks

D

Costs of Adopting UNIX/Open Systems Cited by Interviewees

Responses to how much the conversion from proprietary to open systems can be divided into two groups: those users who converted as part of a companywide revamping of information systems (including EDI), and those companies who converted just their EDI function.

The companies that converted (or were in the process of converting) their entire company's IS claimed to have spent up to millions of dollars in the process. See cases #8 and #10.

Companies who converted just their EDI/electronic commerce capacity spent from $15,000 to $250,000 including equipment, EDI server software, communications software, and other peripheral equipment (such as modems or increased disk memory devices). See cases #4, #7, and #11.

For the most part, interviewees were vague or did not want to reveal how much they have spent on open systems components. Furthermore, they were vague on exactly how much they were saving monetarily (e.g. in terms of software maintenance, etc.). They were unambiguous, however, in declaring the correctness and necessity of the decision to convert to open systems.

E

Drawbacks of UNIX/Open Systems Cited by Interviewees

While interviewees were unanimously satisfied with their decision to convert to open systems, they nevertheless had complaints about open systems, in particular UNIX. These are summarized in Exhibit III-5.

EXHIBIT III-5

Drawbacks of UNIX

- UNIX difficult to learn and use

- UNIX not widely used enough

- UNIX not sophisticated enough

F

Desired Features/Anticipated Future Services Cited by Interviewees

Users commented on features and services of UNIX that they would like to adopt in the future. These are listed in Exhibit III-6

EXHIBIT III-6

Desired Features of Open Systems in the Future

- X.500 directory/full OSI compliance

- Internal document/messaging tracking and auditing

- Easier-to-use network administration tools

- Real-time capabilities

- Improved data mapper

- E-mail

- Workflow features

- Direct connect to trading partners

G

Alternatives to UNIX

In the trend to rightsize computer platforms (either move from larger mainframe systems to smaller ones, or from smaller PC systems to larger ones), UNIX is not always the preferred operating system.

The IBM AS/400, a proprietary system, has enjoyed rapid sales both in general and specifically as an EDI platform. EDI translation software sales for the AS/400, as a single category of EDI software, has maintained the highest growth rates in sales for the past two years. The growth is expected to continue as companies hope to migrate the AS/400 to a good target platform. There are several EDI vendors selling in this category: System Software Associates, Extol, Premenos, Sterling Software, and Blue Rainbow.

Some user commented that the AS/400 is more sophisticated in features than UNIX.

Also, Microsoft NT is another soon to be contender as an alternative to UNIX. More about this and other operating systems in Chapter V.

IV
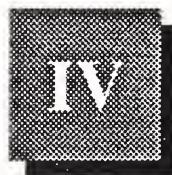
Cases

This chapter consists of 11 narratives describing specific cases of users adopting an open systems environment within which to conduct EDI.

A

Case # 1: Semiconductor Manufacturer [Sunnyvale, CA]

Old platform: Amdahl
New platform: Sun Workstation, NCR 3550
Cited benefits of UNIX for intercompany data exchange: EDI, E-mail, software and file exchange with customers

This multibillion dollar semiconductor manufacturer adopted an open system approach to enhance intercompany file sharing and data transfers including EDI. However, it is important to keep in mind that this company and its customers, being extensively engineering environments, already were heavy UNIX users for many years (since the early eighties). Thus it was no coincidence that its EDI platform would also be a UNIX-based system. But there is more to the story.

The company is a world leader in ASICs. It must work closely with its customers in designing semiconductors because each semiconductor product, by definition, is customized to meet the specific application/function embedded in the customer's product. Thus, the company gives its customers a CAD design software package with which they design, simulate, and specify their semiconductor performance criteria. The output of this design/simulation software is shipped back to the company, and the company uses it to begin building custom chips. The process of transferring and updating this design software is best done basing it in UNIX, as well as for the company to receive back the simulation output.

In addition to distributing software, the UNIX platform is also tying its customers into the internal UNIX- and OSI-based E-mail system at the company. Consequently, the company wants to install an X.400 compliant E-mail network and, very importantly, an X.500 directory that includes company employees as well as customer addresses.

The company's MIS applications still run on an Amdahl in a proprietary (MVS) mode, although the rest of the company consists of UNIX workstations in a vast client/server network (with over 200 servers).

The UNIX-based EDI platform (ABC Server running on NCR 3550 multiprocessor computer as communication gateway) was just a requirement that naturally resulted from the company's already UNIX environment and need bond with customers. Open systems were instrumental to improving the company's connectivity with customers.

B

Case #2: Transportation Industry Service Bureau [Chicago, IL]

Old platform: third-party processing service
New platform: IBM RS/6000
Cited benefits of UNIX for intercompany data exchange: able to "insource" their data processing and give better service to customers

The motivation to adopt open systems, particularly a UNIX platform, stemmed entirely from a desire to improve the company's EDI and electronic customer services. Note that the company's main business is concerned with supporting EDI transactions and related data transfers with customers. Seventy percent of its data communications with customers is done via EDI. EDI is the company's raison d'etre.

An open approach allowed the company to accomplish two major objectives: (1) it allowed the company to in-source processing capacities that it had previously outsourced to a large time-share provider (Martin Marietta) including mailbox functions and (2) it allowed the company to build software modules for customers to generate custom reports (on their transportation and logistics operations), which ranged in sophistication based on the need of the customer. The UNIX-based modules could be tailored for the PC and simple report generation or for large mainframe-level applications. Thus, UNIX has allowed the company to offer software and services that can be tailored to the sophistication of customers and be relatively hardware independent at the same time. The software and services can be directed at a wider variety of platforms that exist in their customer and prospect universe.

Migrating to the open environment entailed the company to shift the system administration in-house away from the service bureau. This has created an extra amount of work.

The biggest problems with UNIX is its cryptic, hard-to-use network administration tools. The director liked the tools in Novell's NetWare much better. He thought NSF was great and liked the idea of being able to mount a directory on his system from someone else's system.

Features of the open environment that the director would like (besides easier-to-use account/multiuser management tools) are tools for internal tracking and validation of documents and messages.

C

Case #3: Health Maintenance Organization (with 20 HMOs) [Minneapolis, MN]

Old platform: Unisys and IBM mainframes
New platform: IBM RS/6000
Cited benefits of UNIX for intercompany data exchange: flexibility to respond to changing market conditions, easier to exchange files with trading partners

EDI was part of the rationale to adopt open systems. EDI was considered a leading-edge type of project, and it, along with other leading-edge projects, required an open systems approach.

The flexibility of open systems and the ability to easily and quickly respond to changing market needs was the main reason for adopting open systems. Because health care reform today is THE top priority, it is a moving target and is receiving many "change orders." Open systems facilitate the company's response to the changing demands.

Open systems have improved the company's ability to work with its trading partners, who are also open shops, in the sense that they can agree on common denominators such as which file formats and software tools to use. However, the greatest synergies have not been attained yet because many of the company's trading partners are not yet open.

Nevertheless, most of the company's legacy applications are already EDI ready, so the move to open systems have not necessarily made the company more EDI capable.

The types of EDI applications are: claims processing, eligibility processing, referral processing, payments, enrollment and clinical information exchanges.

The legacy applications are on Unisys and IBM mainframes. The UNIX platforms are IBM RS 6000s and the company is evaluating Unisys and HPs. Currently it uses the AIX UNIX operating system.

Open architecture is expected to reduce software maintenance but it is too soon to tell. The IS system performance should improve because open systems has allowed the company to implement a 3-tier client/server architecture. Mainframes act as data repositories and workstations allow them to do processing cheaply. Open systems allow the company to add MIPs cheaply as needed.

D

Case #4: Glass Process-Manufacturing Company [Midland, Michigan]

Old platform: IBM (MVS) mainframe
New platform: IBM RS/6000
Cited benefits of UNIX for intercompany data exchange: direct connections with trading partners/bypass the VAN, greater internal integration/ creation of event-driven environment

The motivation to adopt open systems stemmed entirely from EDI. The company was purely an IBM mainframe shop. It adopted an open approach when it decided to create a communications/EDI service to connect with its suppliers and customers. The rest of the company stayed in the mainframe, MVS mode while the communication gateway was built on a UNIX platform. The gateway consists of 2 IBM RS 6000s (one used as back up) running AIX, EDI translation software from American Business Computer and modems and communication software from Cleo.

The key benefit of doing EDI in a UNIX/open mode was that the company could communicate directly with trading partners in a dial-up mode and bypass third-party value-added network services. Twelve out of the company's 60+ EDI trading partners are dialing directly with the company. Although direct EDI is possible in a proprietary mode, open/UNIX makes its easier to do.

The UNIX/EDI gateway also made it easier and safer for the company to let trading partners access files on the company's mainframes. As a front-end, it acted as a barrier and traffic cop. The company would not have let trading partners dial directly into the mainframe.

UNIX also greatly enhanced the integration of applications internally to the company. The mainframe environment was batch-oriented and did not move files until specified times and in large transmissions. With UNIX, "data manager" processes act to keep data moving. The data manager automatically kicks off mainframe applications when incoming EDI data arrives. Similarly, when mainframe applications create files to be made into standard EDI transmissions, the data managers make sure the data is transferred over to the translation software. The result is that the company has moved away from the slow, batch movement of data and created a more "event-driven" environment for passing data inside the company's IS system and between the company and its trading partners. UNIX has "smoothed out and speeded up" the EDI processing, according to the EDI manager.

The company wants to move into real time EDI, where data is moved between application and translator and between the company and its trading partners in single sessions. It is moving to adopt LU6.2 networks. The open environment will facilitate real time.

The EDI manager says that the company will readily bring in bigger UNIX processors as soon as the EDI volume increases.

E

Case #5: Construction Materials and Houseware Manufacturer [Oklahoma City, OK]

Old platform: Honeywell Bull mainframe
New platform: Sequent 2000
Cited benefits of UNIX for intercompany data exchange: more responsive to trading partners due to multitasking, event-driven processing environment; gains in software maintenance and performance

The mandate to adopt UNIX in this company applied to all IS functions and was part of executive management's strategy to be "as technologically advanced as possible." The company's main applications already resided in Oracle data bases. The switch over involved principally switching out the old Honeywell-Bull mainframe and replacing it with a Sequent 2000 (with 134 megabytes of memory). The company also purchased UNIX-based EDI translation software (from St. Paul Software). EDI translation takes place on the Sequent and was moved over to the Sequent after formerly being done on a DOS-based PC.

The EDI program manager had to learn UNIX. He considered himself a "DOS person" prior to the transition. Despite this programming bias, he said that UNIX brought tremendous benefits to the EDI process at the company.

He stated that the principal benefit of UNIX for EDI was its multitasking capability. With multitasking, the system can gather data (from the Oracle accounts receivable data base) to prepare an invoice for a customer. Once this data has been gathered, a macro is triggered to process it into an EDI transmission. At the same time as the macro is processing, the system can start gathering data to prepare another invoice for another trading partner.

Multitasking allows for many functions to be taking place simultaneously. Another function that can now take place more often (than when the company was strapped into the batch orientation of DOS) is the polling of the company's EDI mailbox on the third-party value-added network service. By polling more often, the company can be more responsive to customers. For example, if a customer leaves a purchase order at seven in

the morning, and the company is polling the mailbox every hour, the PO will be processed and possibly be shipped that day. In the old system, mailbox polling had to wait for the completion of many other (batch) processes. Often it wouldn't be until the end of the day before the machine could be freed up to check the mailbox.

Multitasking has allowed the company to operate in a real time mode, according to the manager.

Another important benefit of UNIX over DOS is its built-in scheduler. This allows the company to evenly balance processing loads over the span of a 24-hour period and use resources more effectively. For example, the manager will process EDI invoices in the early hours of the morning when there are no other system needs.

Combining the multitasking and scheduler brings a more dynamic and responsive use of computing resources at the company. For example, while EDI invoices are processed in batch in the morning, the company will process purchase orders at whatever time they come in.

In addition to the expanded features of UNIX, other benefits are in the interrelated areas of software maintenance and system performance —both of which improve according to the manager. UNIX, along with St. Paul Software's file mapper (which is written in C), allows the company to build uniform data maps (APIs, application data generators) between the EDI translation software and the application. In the DOS environment, special reformat programs that stripped out data had to be developed for each trading partner. These special programs were written in several different programming languages: BASIC, Cobol, C and batch files. However, these special programs are no longer needed. All mapping functions are done in a single easy-to-use mapping program. This saves in software maintenance because the software technicians at the company need only to familiarize themselves with the mapper, rather than the strange bridging software. In addition, the simplified mapper also improves the overall processing performance of the company's IS system. Less intermediary processing steps are required to get application data in and out of EDI formats.

F

Case #6: Computer Store and Distributor [Minneapolis, MN]

Old platform: MS-DOS PC
New platform: IBM RS/6000
Cited benefits of UNIX for intercompany data exchange: internal integration of applications greatly aided by scripts

This company's two key applications, its distribution and accounting systems, were already written for UNIX. The company chose a UNIX-based EDI system to fit into the existing environment. Not surprisingly, the company is finding that integrating applications with the EDI function is made much easier when all software runs in the same environment.

The integration was made easier because UNIX has easy-to-write scripts that define file transfer procedures. In a DOS environment, this was painstakingly done in a manual manner.

The company was still in a test phase with the UNIX translation software and did not have much to say. The new translator is from St. Paul Software and runs on an IBM RS 6000 along with Compaqs.

The IS director said that the company intends to use a VAN to do EDI. It simplifies connectivity: "do it once and solve the problem" (as opposed to connecting directly with every trading partner).

G

Case #7: Semiconductor Manufacturer [San Jose, CA]

Old platform: MS-DOS PC
New platform: IBM RS/6000
Cited benefits of UNIX for intercompany data exchange: hardware independence allowed easy migrations; scripts allowed for better integration and processing

This company had its administrative applications (financial and order-management) already running in a UNIX environment. Thus the decision to implement EDI in a UNIX environment naturally followed. Nevertheless, the company had conducted EDI on a PC (running DOS) for an earlier interim period.

According to the EDI manager, it was the hardware independence feature of UNIX that was the chief benefit of implementing EDI in UNIX. She said that the IS department boss is "wheeling and dealing" to achieve good prices on equipment and platforms. New computers might possibly come in the door and systems needed to be able to run on them.

She added that having the administrative applications already running in a UNIX environment made a UNIX/EDI server easier to integrate because file transfer was easier to execute than in the DOS environment.

In fact, the old DOS-based EDI translation software was never integrated with the applications. Data had to be rekeyed.

With the UNIX-based product ("e" from Premenos), the EDI manager could incorporate processing in the translation phase. She wrote "scripts" for moving and converting data from one file format to another. Scripts allowed her to combine many processing functions into one stream of processing. For example, when an EDI purchase order came in, certain inspections need to be done: error/exception checking and reporting, another processing job in the order management system would need to be executed, etc. These subprocesses can be executed in a single stream of processing.

Also, with "e" she could write the output of the translation process into SQL code which would immediately interface with the application data base.

Working in UNIX allowed the manager to easily maintain translation maps, which moved data from the flat-file EDI standard format to the variable length file of applications and back. For a new trading partner, she would merely copy an existing map/script and modify it to fit the needs of the trading partner. This way she could easily duplicate all the incumbant data processing and workflow steps of translation without having to code everything from scratch.

The EDI function at the company runs on an IBM RS 6000 using the "e" language from Premenos, which is a specialized EDI language written in C that runs in UNIX environments. With "e" users create file maps and translation scripts to convert data from one file format into another. The software costs in the tens of thousands of dollars.

H

Case #8: Apparel Manufacturer [San Francisco, CA]

Old platform: MS-DOS PC
New platform: Sequent 2000
Cited benefits of UNIX for intercompany data exchange: flexibility and portability; expandable memory; scripts

The company adopted open system architecture for all IS applications in the company, not just for the EDI function. EDI translation software (from St. Paul) along with other applications runs on a Sequent 2000 (a multi-processor UNIX machine). The company had formerly done EDI on a PC with a package from GEIS.

Most of the applications are based on Oracle data bases. The company uses 4GLs to interface the translation software with the data base.

According to the EDI administrator, the chief benefits of UNIX for EDI has been flexibility and portability without any ties to hardware.

The administrator spoke highly of the scripting features of UNIX. He stated that scripts "allow you to do anything that you want", as well as specify processing.

Another major improvement was the expanded memory that UNIX allowed. Before, in the DOS environment, the company had trouble loading the version tables of the EDI standards and pulling off its daily EDI mail from the network. It pulls about two to three megabytes of mail per day. With UNIX, it has plenty of memory.

The administrator also like the RCS utility of UNIX, which keeps track of all versions of a computer program.

The administrator spoke of features that he would like including X.400 and X.435 capability. In addition, he wants a utility and/or directories to manage software interfaces with the translator.

I

Case #9: Label Printer [St. Paul, MN]

Old platform: Data General
New platform: Data General (same)
Cited benefits of UNIX for intercompany data exchange: only realized benefits were internal matters: the switch to UNIX expanded the selection of application software also allowed for central management

This company, a canned-goods label printer, chose UNIX because it was having difficulty finding application software that ran on the proprietary operating system of its mainframe computer, a Data General. When the company decided to go with UNIX, it had a greater selection of application software to choose from. Since all the applications were in UNIX, it decided to have its translation software also run under UNIX.

The IS manager didn't believe there was any inherent benefit of doing EDI in a UNIX mode. He felt that all the functions of his EDI translation software (from St. Paul Software) could also be done in a proprietary package. He did not report any advantages of UNIX when integrating the EDI software with applications software.

UNIX allowed the company to consolidate its platforms all onto a single mainframe. The IS manager noted that this was contrary to the popular trend of decentralizing. He saw this ability as an advantage: it was easier to manage and the company achieved greater value out of the resource than when it had several platforms performing specific functions.

He said that they had to pay more for the EDI and other software because it runs on a mainframe platform instead of a PC. But he considered this a small price for the benefit of having everything on a single easy-to-use box.

The use of a third-party VAN was important to the company. It didn't want outsiders calling into its systems and, thus, controls its communications.

In the upcoming future, the manager thought that an E-mail capability would be the next service that the company would want to add to its communications and messaging capabilities.

The company is doing EDI with only one trading partner and is in the process of bringing up another.

J

Case #10: Computer Manufacturer Division [West Columbia, SC]

Old platform: NCR Tower
New platform: NCR 3450 and 3550
Cited benefits of UNIX for intercompany data exchange: EDI processing is easily scalable upwards as EDI volume increases; more responsive to trading partner messaging leading to higher customer satisfaction; more event-driven application environment; better communication features than earlier EDI software.

This major computer manufacturer has a mandate to build a UNIX-based enterprisewide information system. All server functions are to definitely be done in a UNIX environment. EDI translation processing is considered a server; therefore, EDI translation was to be done in UNIX. Therefore, doing EDI in UNIX was just part of the overall strategy of the company to establish a UNIX environment inside the company. The company still has mainframe applications. But, according to the EDI coordinator, throughout the company the goal is to get as many applications off mainframes and onto UNIX servers as possible.

The general benefits of UNIX (hardware independence) enhance the specific function of EDI. As part of the company's construction of a UNIX environment, it is gradually introducing hardware. It started out with NCR Towers, then switched to NCR uniprocessor 3450 machines and is now installing multiprocessor 3550 machines. When installing a new machine, the existing software is just ported over, booted up and it is running without doing anything. In addition, the 3400 and 3500 series are

based on Intel -486 microprocessors. These microprocessors can be taken out and replaced with Intel's new faster chip, the Pentium. All the while nothing has to be done to the software and its performance just gets faster and faster with the faster hardware.

The company does EDI with 10 trading partners and picks up mail from its VAN every hour. Translating documents takes only minutes. "We have no problem with speed," says the EDI coordinator.

Related to the hardware issue is that the company is realizing gains from working with commodity hardware. It no longer has to rely on mainframe experts to fix problems when the mainframe breaks. Mainframe expertise (usually in the form of hired outside consultants) is expensive and getting harder to find these days. With commodity microprocessors and replacable hardware—where whole systems can be replaced but the software re-tained—managing the IS function is very easy. One only has to concen-trate on the software.

Another general benefit of UNIX that is enhancing the EDI function is the distributed and real time nature of UNIX processing. The chief complaint of the mainframe world by the coordinator was that all processes were done in a batch mode. Now, with applications and EDI servers running in a client/server mode, processes are executed when there is a need for them.

For example, the company checks its EDI mailbox every hour. If there are messages, it immediately translates them and sends the resulting files to the appropriate application (order-entry, etc.) In the older batch mode, checking the mail box and translation happened only once a day. In the new mode, events happen closer to real time and allows for same-day service instead of next-day or next two-day service.

"UNIX allows us to give better customer service," says the EDI coordina-tor. It gives them real time access to information.

With regards to EDI, a benefit of UNIX is its communication capabilities. In short, they are already built into UNIX. The company didn't buy any special communication software to communicate with its EDI VAN. It just bought the EDI translation software (from American Business Computer) and used the UUCP protocol option with its VAN. UUCP is a UNIX communication protocol and has error protection and auditing functions built into it.

Also the communication features of UNIX allowed the EDI coordinator to be able to log onto the EDI server from anywhere in the world via the Internet. Once logged on (going through a password/security routine), the coordinator could check the operational parameters and make modifica-

tions. (The ability to log on a remote check on the EDI server could not be done through the EDI VAN because the VAN provided only store-and-forward communications. The server could not be logged onto in a real-time mode as is possible through an Internet connection).

Some services and functions that the coordinator saw coming in the future included: (1) bypassing the VAN with direct UUCP connections to trading partners (and utilizing the inherent communication features of UNIX) and (2) reworking the internal workflow of order processing in the company. Reworking the order entry was a matter of expanding on the client/server concept using large quantities of distributed data bases that are interconnected.

The company is using increasingly Oracle data bases to implement its UNIX-based architecture.

K

Case #11: Furniture Manufacturer [Muscatine, Iowa]

Old platform: mainframe
New platform: IBM RS/6000
Cited benefits of UNIX for intercompany data exchange: many functions could be automated and relieve the intervention of a systems operator; the legacy proprietary systems could be maintained

The company switched from a internally developed EDI capacity to a third-party UNIX-based software package (Premenos' EDI/e product). The company switched over specifically because it wanted to do EDI in a UNIX environment.

According to the EDI manager, the company adopted UNIX because it wanted (1) less expensive MIPS (and move the translation function off the mainframe and onto an inexpensive workstation), (2) faster and more flexible (not batch) communications, and (3) better security (not having transmissions directly interface through the mainframe but go through the workstation/server).

Besides meeting the objectives stated, the company found other advantages to UNIX for EDI. First, UNIX allowed the IS department to fully automate many operations and, thus, to reduce the time spent by systems operators who formerly had to manually initiate processing functions. Especially in the realm of communications with trading partners, this benefit was very important. Instead of requiring a person to load and begin communications with the company's VAN at periodic times during the day, all transmissions (sending and receiving) are now automatically activated.

Another benefit of UNIX, according to the manager, was that its flexibility allowed the company to keep EDI applications proprietary, while at the same time incorporating standard X12 EDI for other applications. For example, an existing (and proprietary) application that processed credit card orders was made more efficient with the new UNIX EDI translation software. The company did not have to rewrite the application or use standard EDI formats to communicate with the credit card processing companies. The legacy processing was maintained yet enhanced at the same time because, with the new UNIX translation software, processing is event driven (as opposed to batch as it was before). And the translation software of Premenos allowed for sending files in any format, standard or not (and including TCP/IP).

Another legacy application was receiving nightly bank deposit reports from the company's bank. These reports are fed into the company's accounts receivable application. Every morning, the company's treasurer knows exactly how much money has been received from customers and how much is in the account. Again, this legacy application could be easily ported over to the UNIX environment without modification. The UNIX translation software (and accompanying communications software) handled the transmissions between the bank using the bank data formats. Because of UNIX, it was easier to integrate the EDI/communication function into the existing application.

To move from its mainframe-based EDI platform to the UNIX platform, the company purchased an IBM RS 6000, a few modems, communications software from Cleo, and the EDI software itself from Premenos. The manager wouldn't say how much total the cost was but INPUT estimates it to have been approximately $100,000.

The manager says that another benefit she sees in the future is when her EDI volume increases. With UNIX she will only have to reinforce her system by adding such things as more disk space and memory, peripherals/modems and, when a real big jump in performance is needed, a new microprocessor (higher-end RS 6000s or even Sun workstations or an Hewlett-Packard minicomputer). Had she put her EDI translation software on a PC, there would have been an upper limit of transaction volume that she would not have been able to surpass without having to revamp her entire software/hardware EDI platform.

The only drawback to UNIX, according to the manager, is the difficulty in programming in its complicated language/environment. She and her staff worked very hard to learn UNIX, she said.

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V
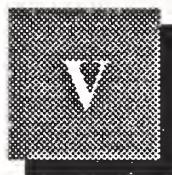
The Impact of Open Systems on Electronic Commerce

This chapter examines in detail the following points:

* Every commercial enterprise now possesses some degree of automation that can link it into a universal electronic commerce network of trading companies.

* Improvements in the price-performance of information systems technology will shortly (in the next 12 to 18 months) reach a point where it is easy and inexpensive for any company to build an electronic commerce system.

* Electronic data interchange software—the software that translates from one file format into another to allow disparate applications software to interoperate—will most likely be incorporated into future operating systems.

* The richness of features that UNIX and NT bring to users for networking, client/server architectures and communications, will enable EDI and electronic commerce users to interconnect their respective systems without much assistance from third-party value-added service networks, and other outsiders, as they have had to in the past.

* Due to the technological change in systems software (namely, the software being open and incorporating EDI functionalities (as mentioned in the previous two bullets), today's EDI software and service providers may not be tomorrow's electronic commerce software and service providers.

A future scenario is posited regarding the manner in which electronic commerce may become widely accepted, and strategic advice is given to users and vendors of electronic commerce information tools.

A

Business and Technology Trends

Two significant historical milestones are occurring simultaneously and are impacting the prospects for electronic commerce:

(1) The information systems (IS) user population, now including even the smallest companies, has reached a critical mass.

For all intents and purposes, all commercial enterprises are computerized. No entity operating in a competitive, market environment is "left out" of the electronic universe. The first pass of a universal electronic infrastructure upon which commercial data processing occurs is more or less in place. Computer-to-computer transactions among commercially trading companies is technically possible if, however, still not economically possible. The communication of information relevant to business transactions, in principle, need not rely on paper documents but could occur through networked computers.

(2) IS technology has reached a critical price-performance threshold.

Systems development tools and operating environments (namely CASE tools, object-oriented programming tools, and the recently adopted operating systems of UNIX, AS/400, and Windows) are giving users an unprecedented level of flexibility, ease-of-development/maintenance and savings in development/operations expenses for information systems. Furthermore, the era of Network Operating Systems (NOS) has begun. Both UNIX and Microsoft's NT are designed specifically with the objectives of linking several computers together to distribute processing among applications in client/server modes of operation. This is in sharp contrast to the heritage of operating systems to date (mainframe to microcomputer), which are designed to optimize a single processor system that stands alone. Finally, price collapses in microcomputers (and now workstations) and mass-market PC software (powerful application packages for under $100) is completing the overall decline in IS expenses. This IS price-performance watermark is allowing users to minimize their investments in information systems, yet still reap the tremendous benefits inherent to automation.

These two simultaneous trends are allowing a mass adoption of electronic commerce. As time goes on, they will act as the boundaries of the potential of the total electronic commerce marketplace. These two trends are shown graphically in Exhibit V-1.

EXHIBIT V-1

The Arrival of the Mass Market for Electronic Commerce

Penetration,
Price/
Performance

Penetration of computers
(—► 100%)

Mass market for EDI
and Electronic Commerce

Price performance of
information systems

Time

↑

1993
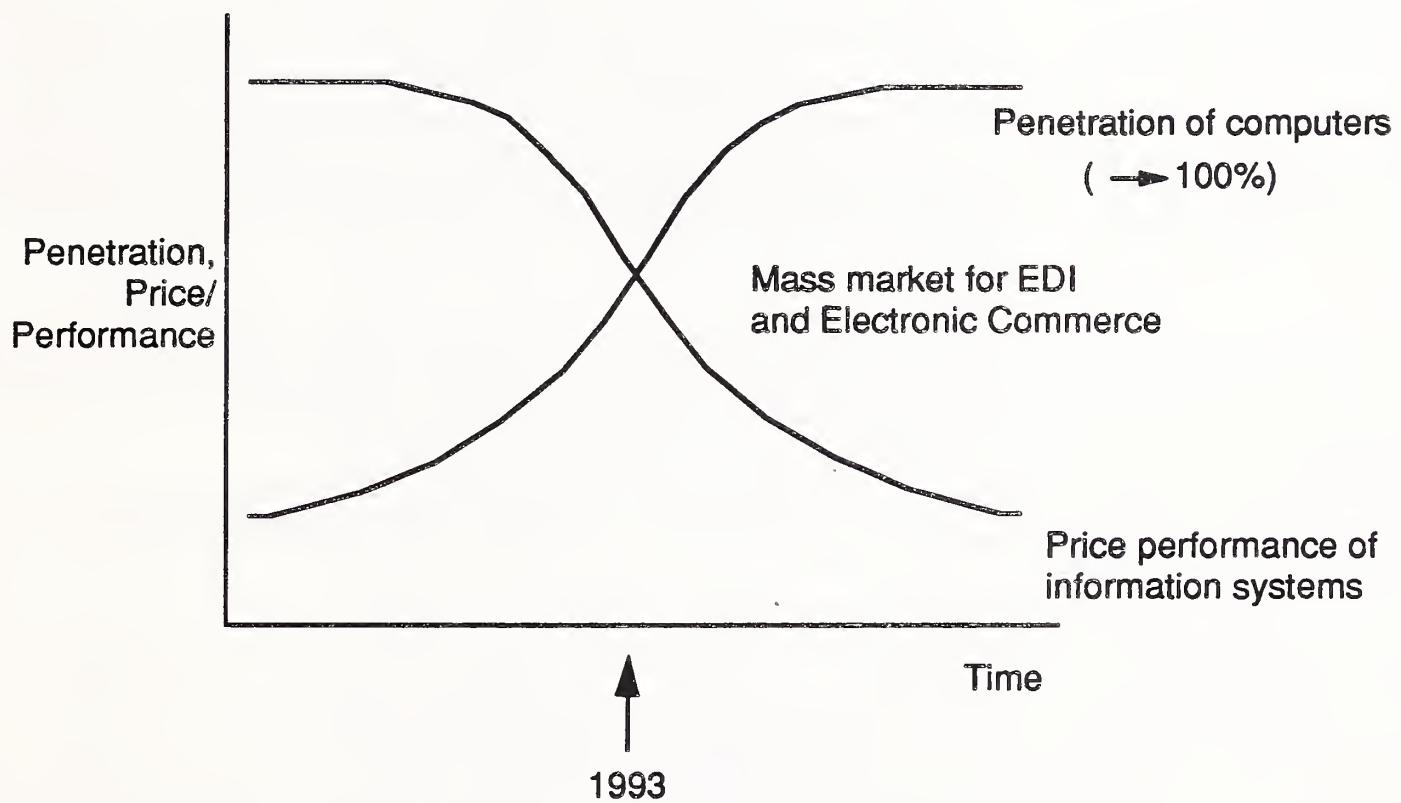
As a result of computer penetration and technology evolution, users are downsizing and networking.

As naturally as water seeking its own level, users are responding to these two milestones. They are getting rid of their old mainframe-based systems and adopting the new lower cost flexible systems. They are seeking to connect these systems with the systems of the companies with which they do business. Establishing interoperable and client/server applications that transcend organizational boundaries should soon be an easy thing to do, because the proprietary nature of electronic commerce systems is a thing of the past. Open systems are spawning a mass adoption of electronic commerce applications.

- Within the past 24 months, hundreds of companies have implemented EDI systems that are running in UNIX environments. The two fastest growing markets for EDI software are for packages that run in the UNIX and AS/400 environments. These environments are largely the two target environments that companies are moving toward in their downsizing efforts.

- Tightly linked distributed processing across organizational boundaries is taking place in some segments and among the leaders of the retail sector. Retailers and their suppliers are capturing point-of-sale data and processing it in multiprocessor computers and/or networks of processors.

- In several industries, intercompany client/server systems are coming into being. The inventory application of one company is a client to the order-entry system of another. The accounts receivable application of one company is a client to the accounts payable of another, and so on. The high penetration of EDI use and interconnected processing applications in some trading communities (e.g. auto manufacturing, etc) has turned the entire community into a virtual distributed processing network.

The remaining sections of the chapter speculates on what is likely to happen with EDI and electronic commerce as open systems architectures, particularly network operating systems, change the software and network service possibilities of the commercial infrastructure.

B

The Future of Operating Systems Software: EDI Functions Embedded in Systems Software

Key points:

- Network operating systems are now de rigeour.

- File-format translation is inherently needed in a network operating system.

- File-format translation software will be incorporated in future network operating system software.

- The likely software vendors who potentially would do this are: Microsoft incorporating TSI International's Mercator in NT and Novell incorporating Premenos' EDI/e in UNIX.

- The incorporation of EDI functionality into systems software will dramatically change the way EDI is purchased and implemented. It will also change the competitive game among today's EDI software and service vendors.

The formal announcement by Microsoft in May 1993 of its new operating system, Microsoft NT, and the completion by Novell the following month of its acquisition of AT&T's UNIX Laboratories (now being called Univell), taken together, indicate:

NETWORK OPERATING SYSTEMS, NOT STANDALONE SYSTEMS, ARE NOW DE RIGUEUR.

Up until now, all operating systems (except UNIX) were designed to optimize a single, central processing unit (CPU). From MVS and the other mainframe families of OS-users to MS-DOS for PCs, operating systems were either for single-users or a group of users clustered around a single CPU/computing platform.

Now, the new category of operating system—the network operating system (NOS), the family to which NT and UNIX belong—is designed to network an unlimited number of processors and to distribute processing of data among applications residing on any number of platforms.

The fact that the top two most successful PC software vendors (Microsoft and Novell) are offering these two basic choices of NOS indicates that there will be a mass market and adoption of these operating systems. In the end, it is the greatest installed base that determines the playing field. The era of network computing has arrived.

Why this evolutionary jump is so important to EDI is that EDI is nothing but a mechanism for the networking of applications in a heterogenous environment. With operating environments that assume applications will be networked, and that processing will be shared across different platforms in a client/server manner. The translation of file formats (a.k.a. "EDI") becomes a key requirement of the environment.

Because EDI functionality is now central to operating environments, two major changes could most likely take place over the next three years:

- EDI translation software eventually will be incorporated into network operating system software,

- EDI translation software will not be sold directly to end-users, as it is today, but sold/licensed to NOS vendors (probably Microsoft and Novell) who will then sell system software (complete with EDI functionality) to developers, value-added resellers and end-users.

1. EDI is More System than Application Software

Keep in mind that EDI technology and its respective industry of software and service providers has evolved over the last 25 years. The architecture of EDI grew up distinct from and subsequent to applications. Users implemented the applications—in mainframe environments—and then, as an afterthought, considered connecting the applications.

Consequently, EDI architecture consisted (and still does) of two parts: (1) standardized file formats that users constantly seek to standardize, and (2) translation software that is a module independent from applications (and even communication) software that performs the conversion from the internal format to the standard format and is purchased separately from a specialized vendor of software.

The end-result has been mediocrity—none of the components of the architecture fit together very well and, in the cases where they do, the composite system has come at great expense to the end-user.

Committee-designed data formats are slow, unresponsive, inelegant, and almost always modified for specific instances of use. The separation of translation and application software keeps the two from interfacing, which is essential for EDI to be a success. Applications are still isolated islands of automation. Translation software and standardized formats are a kind of stop-gap, patching together of the applications.

Now for the first time, users are migrating applications either entirely off of the mainframe or at least significantly shared with the mainframe to create a widely distributed computing environment.

This represents a great opportunity for EDI to redefine itself architecturally. It no longer has to be mainframe-centric and carry with it the legacy of being an afterthought service. This mainframe-centric attitude was a liability for EDI. In a distributed environment, users will automatically expect to conduct EDI, which must, therefore, be made easily available.

2. Changes to the EDI Vendor Community

At this time, the most likely system vendor candidates to incorporate file translation (EDI) functions into operating software are: Microsoft and Novell.

Specific EDI software vendors who might be involved in this move are: TSI International, with its Mercator product and Premenos, with its EDI/e product. Mercator could be incorporated into any operating environment (NT, UNIX, even DOS). EDI/e, written in C, would be best incorporated into UNIX.

Along with the architectural metamorphisis of EDI, so too will the industry (of EDI vendors) change. If EDI software is incorporated into the operating system software (say UNIX, NT or the AS/400 OS), then end-users will buy EDI from the vendors of these environments (Novell, Microsoft or IBM).

The old categories of market participants that held during the eighties—
translation software vendor, application software vendor, service provider
and platform vendor (hardware and OS) all trying to sell directly to the
end-user big and small—is disappearing.

In their place is a new industry structure of participants as depicted by the
illustration in Exhibit V-2.

EXHIBIT V-2

Channels in the Electronic Commerce Software Marketplace

Technology software vendors (incl. EDI security, workflow)

Non-PC systems and applications software vendors

OS software vendors

Mass market PC applications software vendors

Reseller

Systems integrators

Service providers industry specific organization

Large companies

Small companies

Vertical applications

Horizontal applications (acct., payments, catalogs, mktg., procurement)

EDI software originates in the technology vendor segment...far removed from the end-user.

Software transaction where the end-point of the arrow is the buyer and the origin-point is the seller

——————▶ =

There are three kinds of players: (1) the software (system and application) vendors, (2) end-users (large and small); and (3) the resellers, systems integrators and service providers (with service providers often being an industry trade organization).

Software vendors are divided into three camps: (1) the mass-market PC software vendors (these include Microsoft, Novell, Intuit, Delrina, Lotus, and the other large PC software vendors); (2) the non-PC software vendors (Tandem, IBM-AS/400,....); and, (3) the technology software vendors (most importantly here, today's EDI software vendors). Overlaying these three are the system software vendors (which today are principally Microsoft, Novell, and IBM).

EDI software originates in the technology software vendor segment. Technology software vendors are typically small companies that build a software product that performs a specific function (such as data encryption, forms processing, workflow engines, or bar code scanning, etc.). File-format translation ("EDI") is one of these specific functions. In the future, EDI software companies—the ones that haven't been purchased by the larger PC software vendors—will exist in this technology software vendor segment. Technology software vendors will for the most part sell to the mass market and non-PC software vendors, not directly to end-users.

Note the channels to the small company. In some ways, this is where the success of EDI/Electronic Commerce will be determined. There are three routes to the small company: (1) through its principal trading partner (a large company that supports it in implementing an electronic trading solution), (2) the reseller/SI/service provider community that provides it with a trading community, vertical market solution (a Pubnet for the publishing community, an Ordernet for the pharmaceutical industry, ...) or (3) a mass-market electronic commerce software provider (such as an Intuit, which provides a horizontal application/solution (in this case accounting software) that can be applied across industries).

Examples of service providers: GEIS, Sterling Software, Advantis/IBM, and BT North America, AT&t

Examples of systems integrators and VARs: EDS, Texas Instruments, Information Access, System Software, Inc., niche players

Large Hubs: Wal Mart, JC Penney, Levi Strauss, Allen Bradley, LSI Logic

Technology vendors: TSI (Mercator), ATI (workflow), Delrina (forms software), General Magic (telescript), Novell (UNIVEL), Microsoft (NT)

Mass Electronic Commerce Vendors: Intuit, Microsoft, Lotus, Delrina

Applications providers will become industry-specific service providers (Levi Strauss providing its own processing; Allen Bradley providing its own system maintenance; Sterling Software becoming a player in an industry). Users and applications vendors are undergoing changes: they are becoming interchangable through alliances, etc.

These blurring of lines in the realm of technology mirror the blurring of lines between organizations and between industries that is going on as a result of technology.

If EDI functionality is incorporated into systems software, revenues for vendors of EDI software will come from two sources: royalties and direct sales. This is shown in Exhibit V-3.

EXHIBIT V-3

EDI Software Market Will Divide in Two
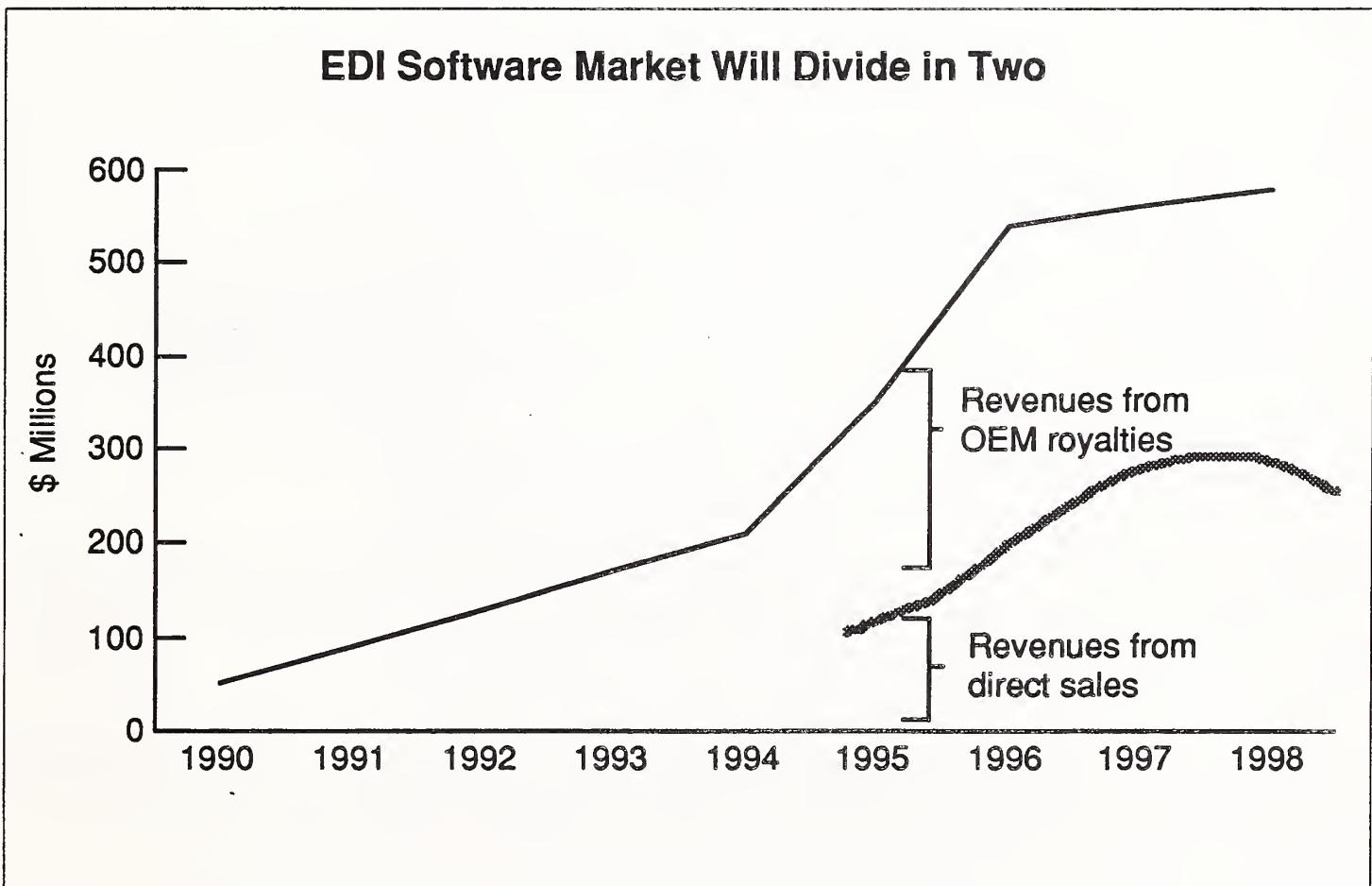
Direct sales of EDI software packages will continue for the higher-end systems; those that run on midrange and mainframe computers. Sales of mid range and mainframe EDI software have traditionally held approximately 60% of the total EDI software market. So, while the microcomputer market will jump from thousands to millions of shipments, there should continue to be sales of standalone EDI packages at some level.

Critical to the continuance of midrange and mainframe EDI software sales will be the extent to which companies migrate off of larger computer platforms and onto the smaller microcomputer systems. Also note that network operating systems NT and UNIX are displacing mainframes and should not be considered microcomputer operating systems.

3. A Quantum Jump in EDI-Users is Possible

Another possibility if EDI functionality is incorporated into systems software, is the occurrence of a tremendous jump in the number of EDI-users. This is shown graphically in Exhibit V-4.

EXHIBIT V-4

The Number of EDI Users Will Jump
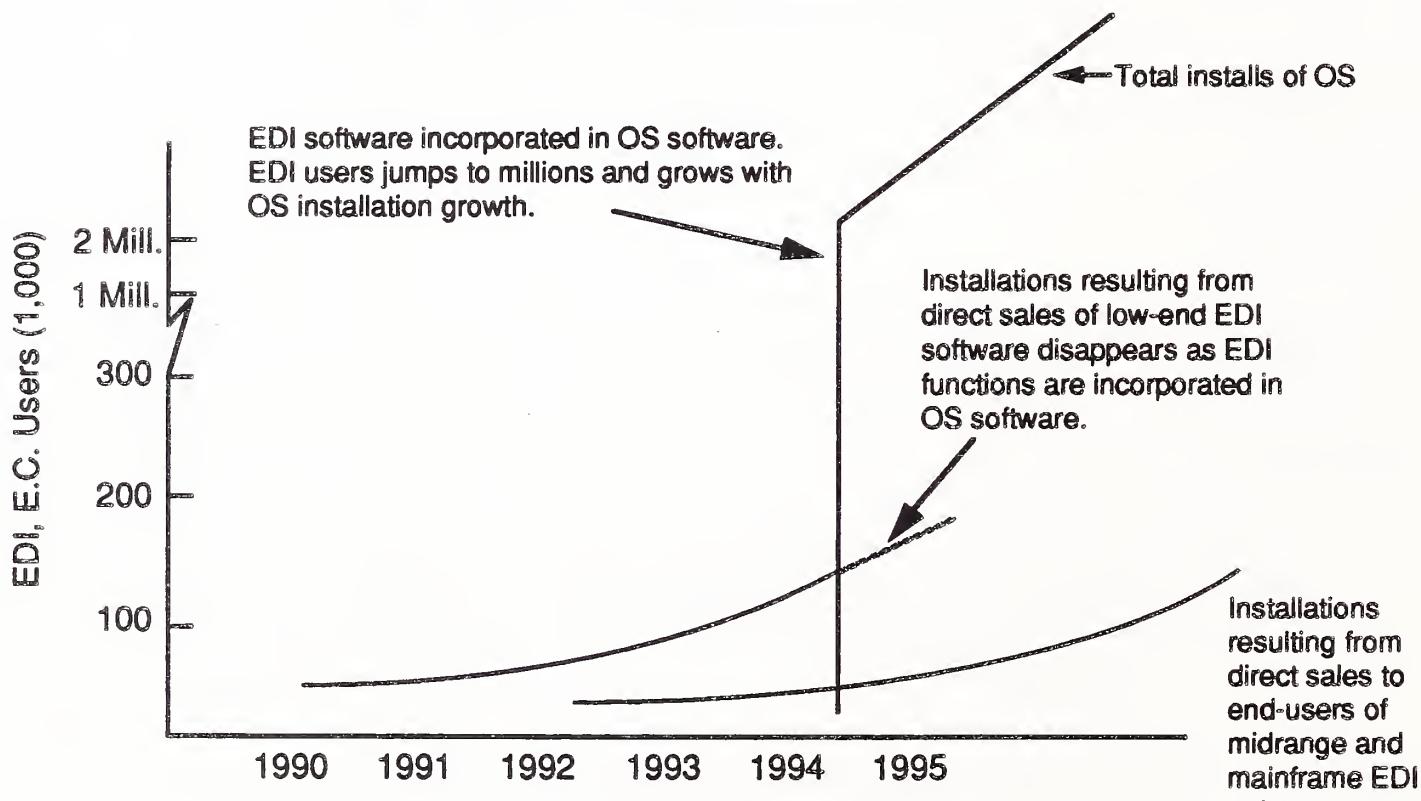
EDI-capable companies will grow in parallel with the shipments of network operating systems, which (as shown above in Exhibit V) is numbered in the millions per year. This is a quantum jump from the only thousands of shipments-per-year of EDI software when EDI was sold directly to end-users as a standalone software package.

C

The Future of Intercompany Networks: The INTERNET as a Model for Electronic Commerce

Key points:

- The INTERNET represents what happens when users and groups of users obtain and use interchangable—"open"—systems components: they autonomously build computer networks to meet their particular needs (and not rely on third parties).

- The INTERNET, characterized as such, is a good model for electronic commerce: with interchangable parts, companies will be able to sponta- neously and relatively easily build interoperating, intercompany systems that fit their needs (the industry of third-party software and service vendors will not be needed to the extent it is today).

- If electronic commerce proliferates in the same manner as the INTERNET, the identities and roles of vendors and users will change and the issue of network ownership will take on new meanings.

1. The INTERNET as the Growth Model

At this time, the INTERNET has two roles relative to electronic com- merce. They are:

- *A network service* over which companies can send EDI, E-mail, miscel- laneous files and other communications of electronic commerce. It is a tool with which companies conduct electronic commerce and is an alternative to today's commercial value-added networks.

- *A model that companies will follow* as electronic commerce becomes more pervasive. It is a way electronic commerce will evolve (regardless of whether the INTERNET itself is used to send message or not).

The latter aspect is more important. The INTERNET is an important model by which corporations can learn how to establish electronic connec- tions between themselves and their trading partners. The first aspect is relatively trivial and, in part, misconstrues what the INTERNET actually is.

The INTERNET illustrates what happens when a community of people with common interests are given interchangable, open-system compo- nents. Networks of computing resources are built to respond to user needs. Communities form and become the focus of network control.

First, realize what the INTERNET is.

- It is the first truly open transorganizational network built with relatively interchangable parts.

- It is not centrally controlled, but a confederation of servers; it is organically growing and self-organizing.

- It is an ad hoc network of computer hubs and users.

- It is technically possible by the flexibility, communications features and "openness" of UNIX and the existence of telephone lines

- It is economically possible because it is financed by community-of-interest authorities (largely academic and research institutions), not individual users.

The INTERNET is a good model for electronic commerce because it maintains these features:

- Ad hoc development (very user responsive)

- Caters to and is financed by communities of interest and/or trading communities

- Inexpensive, interchangable components and open architecture will facilitate the building of intercompany interoperational applications

- Highly communications-oriented; access to multitude of servers, virtual resources

- Store and forward environment ("real-time enough")

The important difference between the INTERNET and the needs of electronic commerce is that the INTERNET is insecure and unreliable as a commercial/production network.

2. Changes to the User and Vendor Community

If INTERNET is a good model for electronic commerce (and electronic commerce will follow its lead), what can we expect to see in the future for electronic commerce?

- User/vendor distinctions will blur. All companies will be located on a continuum ranging between line/equipment provider to server provider to single client-user.

- "Ownership" of the network will take on a different meaning than it traditionally has had. It will no longer be important whether a company owns the physical lines or box which messages are stored and forwarded. More important is who possesses the membership enrollment authority: the ability to sign up or keep out subscribers from a particular club/community of users.

Implications for specific EC parties:

- *Value-added networks* - can still be viable but must bring real-added value. Mailboxing data is no longer a value-added service (because anyone with a PC and a couple of modems can do it). VANs will have to provide services unique to trading communities. To use the client/server framework, they will become mega-servers in a niche of clients. Your competitors are not only other VANs but large hub companies that offer specific services (such as communication companies, publishers, media companies). Differentiation of service offering is the best competitive strategy (with emphasis on delivering vertical/industry-specific and application-specific expertise).

- *Software vendors* - charge by the number of subscribers (or trading relationships) that use your software. In other words, your software will become a server in an extensive client/server universe of companies engaged in trade. Already, the UNIX, EDI and systems software vendors are doing this.

- *Users* - either join or establish a club. Don't be left out. If you are a small company, belong to some trading community(ies). There will be some authority in charge of the community who will patronize your membership in some way (a trade association, a large trading partner, a government agency, a niche-specific service bureau, etc.). If you are a large company, you want to become an authority by which you control membership in a community of interest. If you are a communication company, publisher, processing service company, etc., see how you might make your vertical-market expertise available on a network. Become a "server" on the ubiquitous electronic commerce network.

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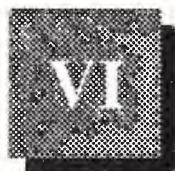
Competitive Analysis

This chapter reviews the major software vendors and companies that are offering UNIX and/or open system solutions for electronic commerce applications. A brief overview of the industry participants precedes individual company profiles.

A

Overview

Today, there are two categories of information technology vendors who are providing or positioned to provide open system solutions for electronic commerce applications.

- EDI and Electronic Commerce software and services companies
- System software and UNIX software/equipment vendors

Exhibit VI-1 lists the principal vendors and potential vendors of open electronic commerce products and solutions.

The products today that most clearly fit the requirements of an open electronic commerce solution are EDI translation software products that are written for UNIX environments. The vendors of these products are listed in the intersection of the two general kinds of vendors who are approaching the open electronic commerce tools market.

EXHIBIT VI-1

Open Electronic Commerce Solution Vendors

Systems Softwware Vendors   **EDI/EC Vendors**

Microsoft

Sun

Novell

IBM (AS/400)

General Magic
IBM/Apple

ABC Blue
Rainbow, EDS, TI,
GEIS, SSW,
Premenos, SPS,
IBM (Advantis),
Trinary, Unisys,
Radley, Perwill,
Birmingham, TSI

Other EDI/EC
vendors with no
open products/
stragegy as of yet
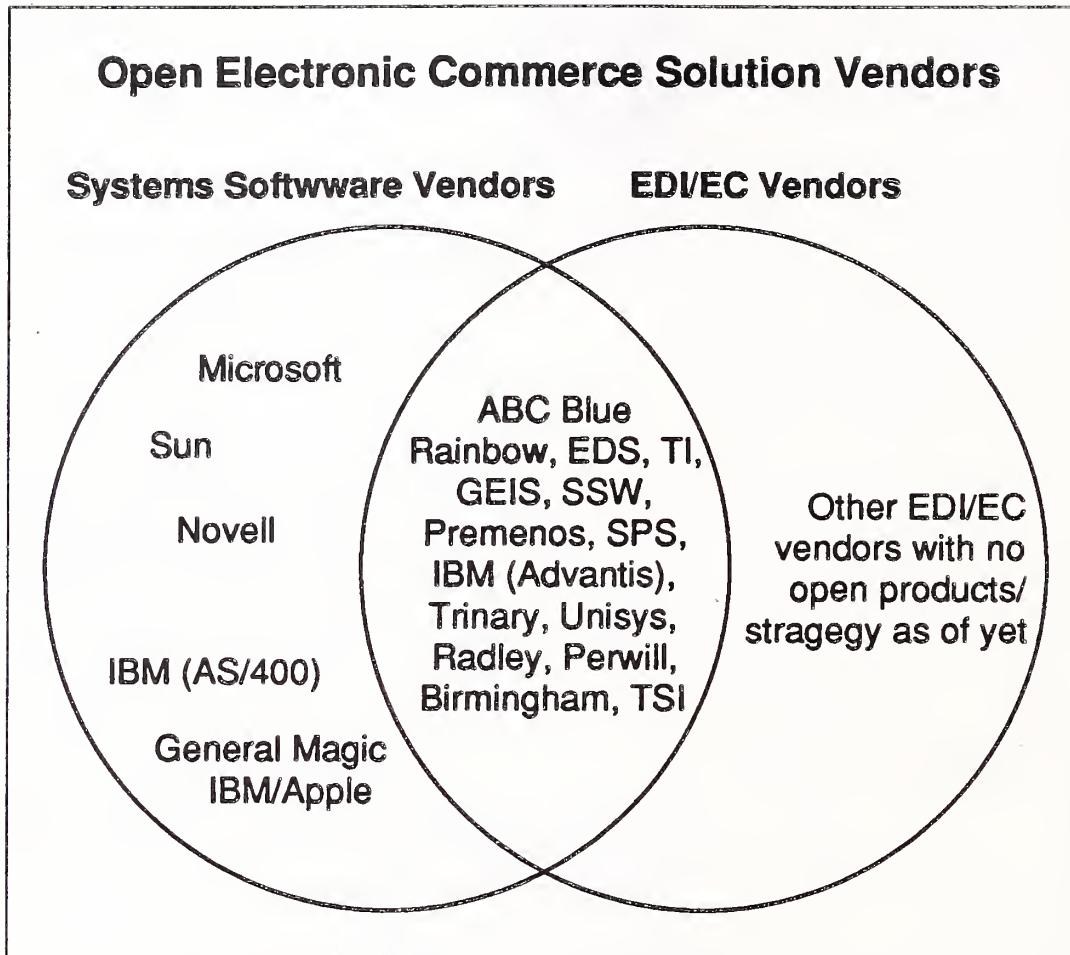
Exhibit VI-2 lists these UNIX EDI translation software vendors for an easy comparison of basic product features.

UNIX-based EDI software came out in 1991 and has been selling well, although the user base is (by first quarter 1993) no more than 200. Typical UNIX-based systems sold to date are mainframe equivalents ranging in price from $20,000 to $200,000. The leaders at this point are American Business Computer (Ann Arbor, MI) and St. Paul Software (St. Paul, MN). EDI market leaders, Sterling Software and GE Information Services, also offer UNIX translation software. Sterling has produced its own product, UNIX Gentran. GEIS resells American Business Computers.

EXHIBIT VI-2

EDI UNIX Software Vendors

Vendor	UNIX Product Name	Price Range (Dollars)	Systems/OS Supported	Telephone No.
ABC	EDI-Server	50,000 - 300,000 (includes PCs)	Pyramid, Sequoia, Tandem, Unisys, Altos, IBM RS/6000, Amdahl, NCR Tower, AT&T 3B Systems, HP 9000, Gould, Sequent, Sun Microsystems, DG Aviion	313 930-7840
Blue Rainbow Software Int'l. Corporation	Multinet/UNIX	(Contact vendor)	IBM AIX	800 258-3433
EDS Canada	EDI*Expert	4,000 - 15,000	PC to mainframe	416 290-2700
GEIS	EDI*Transit	9,000 - 41,500	ATT UNIX, Amdahl, Gould, Altos, Data General, Hewlett-Packard, NCR, Pyramid, Sequoia, Unisys, Sequent, Tandem	301 340-4000
Premenos	EDI/e	10,000 - 60,000	IBM RS/6000, HP 9000	510 602-2000
St. Paul Software	Datatran	4,500 - 18,000	-386, NCR, HP 3000, 9000, Sequent, Pyramid, Sequoia	612 641-0963
Sterling Software, Inc.	Gentran for UNIX	7,500 - 42,500	IBM RS/6000, HP/9000 (avail. Dec)	614 793-7000
Trinary Systems	EDI Windows	9,000 - 35,000	DEC Vax, HP 3000, 9000	313 442-8540
Unisys	EaDIplus	14,000 - 35,000	Unisys 6000, AT&T UNIX System V	215 986-2000
Radley Corp.	Computerized Automotive Release Accounting	1,995	AIX, DG/UX, HP-UX, SCO, UNIX SVR3X	313 559-6858
Birmingham Computer Group, Inc.	Doc-U-Map	11,200	UNIX System V MIPS RISC	313 333-7300
Perwill	Perwill EDI UNIX	N/A	AIX, HP-UX, Interactive UNIX, SCO UNIX System, Sun OS	216 642-7565
Texas Instruments	UNIX EDI Software	N/A	HP 9000 HP UX 7.0.2	214 575-4714

B
Profiles of EDI/Electronic Commerce Vendors

1. Advantis

231 North Martingale Rd.
Schaumburg, IL 60173-2254

Marketing Headquarters:
3405 W. Dr. Martin Luther King Blvd.
Tampa, FL 33607
813-878-3000

Revenue: $1 billion (INPUT estimate)
Chief Contact: Syd Heaton, Chairman and CEO

a. Company Background

Advantis was formed in December 1992 as a joint venture formed by IBM
and Sears, Roebuck and Co. IBM's Integrated Systems Solutions Corpora-
tion (ISSC) holds the majority interest (70%) in Advantis in addition to
providing networking support. Advantis merges the operations of IBM's
Networking Systems Service (NSS), including IBM Information Network
(IIN), IBM internal telecommunications and ISSC's custom networking
organization, and Sears Technology Services, Inc. (STS), including Sears
Communications Company and the information systems professionals
who support the Sears family of companies. Advantis combines two of the
world's largest information networks into one company, providing cus-
tomers network access from 650 cities in more than 90 countries through
IBM affiliates worldwide.

IBM manufactures one of the most popular UNIX workstations, the RS/
6000.

b. Strategy

Advantis' EDI and electronic commerce offering includes EDI translation
and communication software that supports proprietary and UNIX operat-
ing systems.

Advantis' EDI/Electronic Commerce strategy, in relation to open systems,
is covering all bases. It provides proprietary as well as open software
products. It includes products that run under MVS, AS/400, System 3X,
DOS, OS2, and UNIX.

It can provide solutions to customers that fit any operating environment.

c. Products and Services

Advantis offers five categories of services: custom network solutions, network services, messaging services, capacity services and information services.

It is through its network, messaging and information services that Advantis' principal EDI and electronic commerce offerings are found.

UNIX EDI products:

- EDI/e: Advantis' principal UNIX EDI software product is Premenos' EDI/e product, which it resells using Premenos' label (see the Premenos profile for more product detail). EDI/e is variably priced according to the number of trading partners and document types of a customer. Prices start at $10,000.

- EDIte AIX: is a communication software package that allows customers in the AIX (IBM's UNIX environment) to connect to the Advantis network (also called Information Exchange).

Texas Instruments has an agreement with Advantis to resell the Advantis network for its customers of its Gateway product (see Texas Instruments' profile).

Other UNIX products:

RS/6000: one of the most popular UNIX-based workstations

d. Key Issues

- Provides complete portfolio of EDI/Electronic Commerce software/ service solutions (proprietary and open) to match any customer environment.

- Vendor of major UNIX workstation (RS/6000)

- Its AS/400 series computers have the same scalability advantages that open systems have and are, in this respect, a chief competing proprietary platform to an open system environment.

2. American Business Computer

24 Frank Lloyd Wright Dr.
P.O. box 305
Ann Arbor, MI 48106-0305
313-930-3200, facsimile: 313-930-3201

Revenues: (FY end 6/31/93) $5 million (company report)
Chief Contact: Kimba Vasquez, President

a. Company Background

American Business Computer (ABC) is one of the first vendors of off-the-shelf EDI translation software. It has been in business since 1977. At one time, ABC was a division of Thomas S. Monaghan, Inc. In 1992, employees of ABC repurchased the company from TSM.

b. Strategy

ABC has a large customer base in the automobile supplier industry with its PC EDI translation software, EDE-PC. With its larger system, the UNIX-based EDI*Server product, it has targeted large hub accounts and the U.S. Federal Government through many strategic alliances including those with NCR/AT&T, Oracle, GE, ISOCOR, Hewlett-Packard, FDC Technologies, ABC also supplies GE Information Services with its PC and UNIX products, which GEIS resells under its own label.

In the past five years, ABC has extended into the health care, manufacturing, retail, electronics, telecommunications, government, chemical and wholesale industries. ABC markets products overseas through integrators and distributors.

INPUT estimates that ABC has over 2,200 installations of its EDE-PC, EDI-Excel, and EDI-Server products combined.

c. Product and Services

EDI-Server: Is a UNIX-based EDI gateway for integrating EDI into business environments designed to allow for the administration and tracking of all EDI processes and flows. It includes mailbox system to allow direct connection to trading partner systems and runs on IBM RS/6000, NCR 3000, AT&T3B, HP 9000, Sun Microsystems, Interactive UNIX and SCO UNIX. Prices range from $50,000 to $300,000 and includes equipment.

EDI-ExCel: Is designed for PC- or UNIX-users with minimal technical expertise. It includes on-line mapping facilities for application integration and comes in preprogrammed packages for specific vertical market environments: retail and auto. It is priced from $7,000 to $50,000.

d. Key Issues

ABC, along with St. Paul Software, pioneered UNIX-based EDI translation software. While it continues to be a leader in this category, the entrance of many other software vendors now providing UNIX EDI software is heating up the competition. ABC, along with competitor Texas Instru-

ments, has the higher end of the price range for UNIX software. ABC's strategy of making alliances of resellers (particularly with GEIS and NCR/AT&T) has served it well and this represents a solid approach to selling ABC's quality technology.

3. Blue Rainbow Software International Corp.

Suite 330
1899 Powers Ferry Rd.
Atlanta/Marietta, GA 30067
404-612-1949

Revenue: $2 million 1992 (INPUT estimate)
Chief Contact: Hans D. Plotzeneder, President

a. Company Background

Blue Rainbow was founded and is headquartered in the U.K. It provided midrange EDI software until the license for it was purchased by GE Information Services. In 1992, Blue Rainbow established a U.S. operation headquartered in Atlanta, GA. It is selling its own label of software in the U.S. from this office.

b. Strategy

Blue Rainbow is positioning itself to provide messaging software products, particularly EDI translation software, LAN E-mail, and workflow in the micro and AS/400 range of computer platforms. It makes products that run in AS/400, DOS/Windows, and UNIX. Due to its limited capital, it has sought alliance and equity partners.

c. Products and Services

Multinet/400: is EDI translation software for the IBM AS/400 computer. It features trading partner profile maintenance facility; standards supported include X12, EDIFACT, ODETTE and Tradacoms and industry-specific; comes with communication modules that connect to most major US and international value-added networks; allows for job stream scripting for unattended operations; has store-and-forward facility for messages; has history and audit control features; security based on user password system; application data interface supports integration with AS/400 native data base.

Multinet/PC: is EDI translation software that runs in MS-DOS environments and has the same features as Multinet/400 product (except for the data interface) and the interactive transaction entry and print facility that allows the user to hand-key in a document and immediately send it or print out (on paper) a received document.

Multinet/UNIX: is EDI translation software that runs under UNIX V (version 4) and IBM AIX environments and uses graphical user interface, point-and-click mapping, user-tailorable menus; setup information (including trading partner profiles, data maps, standards) can be added or modified interactively via on-line screens.

Messenger: is E-mail software for the AS/400. It is designed for the messaging needs of a small user base, expandable to a midsized company. and has built-in gateways to LANs and public networks.

d. Key Issues

- Viability as a company - Does it have enough capital to continue to wage competitive battles?

- Can it keep up its technology development?

- President Hans Plotzenader brings impressive marketing credentials, experience and connections as he was formerly the product manager for IBM Information Network's (now Advantis') midrange EDI products.

4. Electronic Data Systems Corporation

7171 Forest Lane
Dallas, TX 75230

Revenue: $8.2 billion (year-end 1992); (non-GM revenue: $4.8 billion)

Chief Contact: John Hickey, Division President, Electronic Commerce
214-604-7900

a. Company Background

EDS, founded in 1962, is a world leader in the application of information technology (IT), providing information processing, systems management, systems integration, systems development, consulting, software products, and process management services to customers worldwide. EDS serves public and private organizations in banking and finance, communications, energy, government, health care, insurance, manufacturing, retail, and transportation. EDS was acquired by General Motors in October 1984 and operates as an independent subsidiary of GM. EDS' largest client is GM, which contributed approximately 41% ($3.35 billion) to EDS' 1992 revenues.

b. Strategy

EDS is organized into scores of units (classified as either a "Strategic Business Unit" or a "Strategic Support Unit") that are aimed at supporting (1) specific industries, (2) specific geographies/cultures, (3) infrastructure issues and technologies, and (4) administrative functions of the corporation. EDS' EDI and electronic commerce business and strategy is concentrated in an infrastructure Strategic Support Unit and is called, the "Electronic Commerce" unit. The electronic commerce activity at EDS is principally built around credit card, Automatic Teller Machine switch business and health care claims processing. EDS has done substantial EDI development and integration work for General Motors. It is leveraging this expertise into a commercial offering directed across industries. EDS' Chairman, President and CEO, Les Aberthal, is knowledgeable about EDI and, noting that 70% of the Fortune 500 uses it, considers it a potent market opportunity.

c. Products and Services:

i. EDI Product and Service Offering

EDI Translation Software

EDI*Asset: is a PC-DOS translation software package that EDS Canada developed for GM suppliers in Canada and is currently installed at approximately 800 locations.

EDI*Expert: is a UNIX package that was designed specifically for Sun Microsystems workstations but can operate under most versions of UNIX. It is priced from $4,000 to $15,000 depending on size of processor.

EDS*Aim: an MVS package.

EDS also acquired microcomputer and mainframe translation software packages when it acquired the French systems integration company, SD-Scicon, in 1991. EDS also resells Trinary Systems' EDI translation software, which runs on Digital and Hewlett-Packard computers.

EDI Network Services

EDS*Net has approximately 450 access points in the U.S. and others in 130 countries around the world. The SNA-based network can receive messages from X.25 networks. In addition to EDI transmissions, EDS*Net supports a wide variety of customer networking needs including EFT and file transfer services. Through EDS*Net, over 730 million transactions are processed each month—nearly 17,000 transactions per minute.

ii. Related Electronic Commerce Services

EDS has a full portfolio of electronic commerce services that it offers to various markets. These include:

- Cable television billing services
- Telecommunications/cellular network billing services
- Insurance claims processing
- Systems operations/facilities management
- Credit card processing
- Automatic teller machine network processing and switching

d. Key Issues

- EDS has the potential to be a premier open systems and electronic commerce vendor. It has the products in every category.

- Needs better focused marketing and sales for delivering electronic commerce solutions.

- Working to combine its many information processing services with EDI, messaging and other software products to deliver full electronic commerce solution. Once this is done, EDS could be very powerful.

- EDS' strategic direction was placed in serious question when General Motors almost sold it to British Telecom. If EDS is sold, who knows what its direction will be.

5. GE Information Services

401 North Washington Street
Rockville, MD 20850
301-340-4000

Revenue:
Chief Contact: Hellene S. Runtagh, President of GEIS and CIO of General Electric

a. Company Background

GE Information Services provides transaction and utility processing; inquiry/response, EDI, and value-added network services; systems integration; and software development and network management professional services to over 13,000 corporate and association clients worldwide.

b. Strategy

Like other EDI software and service providers, GEIS observes that there is a market need that is greater than the narrowly restricted EDI segment. As networking becomes the predominant systems integration challenge of the 1990s (supplanting the challenge of the 1980s: installing personal computers for workers), users are asking for a wide variety of capabilities—not just EDI—to solve their general business needs. Electronic commerce is the networking that takes place among companies. EDI is only one component of this. GEIS is targeting the more broadly defined opportunity of "electronic commerce."

In short, GEIS' strategy has these key points:

- It is assembling a variety of software and services products—from EDI software, to forms processing, to workflow, to data bases in some cases distributed partially on its network and partially on the customer's internal system.

- It is not attempting to build all of these tools itself—and squandering its resource—but sourcing them from companies who have invested time and resources into them and have already demonstrated their product excellence (such as forms software from Delrina Technology Inc).

- It is remaking it antiquated network service platform

- It is embracing a far-reaching open systems architecture—both for its own global telecommunications and processing network and for the software and services its offers its customers. The architecture, referred to as "distributed services/integrated messaging," appears to be so robust that it should lay the groundwork for ongoing product add-ons and expansions, which is currently unforeseeable, well into the future.

- It is focused on trading communities. This focus distinguishes GEIS as a solutions vendor because only when a vendor sells at a trading community level—and not merely a single company level—is it offering a truly electronic commerce business solution. Indeed, GEIS defines electronic commerce as "linking a business community electronically."

Open Systems Emphasis

GEIS is seeing that it no longer is competing on technology. Technology is a non issue as standardization takes over. No longer able to differentiate itself on technology, the successful information service provider must bring facilitation to the individual customer as well as the trading community. This consists of new business services, critical mass of trading partners, and others.

As such, GEIS sees its role moving away from providing proprietary solutions to single customers and toward open standardized solutions to whole trading communities

Parallel to the shift in the nature of its services, GEIS is also revamping its network. In the sixties, when it began, GEIS was a proprietary network that built its own applications operating systems. In the 1980s, it adopted an IBM platform with SNA. It is now migrating away from these to a distributed platform that is UNIX-based. In addition, it is sourcing most of the components. Already it has four nodes on its network that incorporate the new UNIX-based architecture.

Marketing Focus

GEIS is aiming at the large hub, multinational corporation as its key account. "The majority of our business comes from multinational companies," said D.J. Crane, V.P. Electronic Commerce Services. The number of these multinational hubs have increased, according to Mr. Crane. In the eighties, there were 2,000, today there are about 15,000 and later in the 1990s he expects the number to be approximately 30,000 to 40,000. Perhaps by that time, the hundreds of thousands of mostly consumer subscribers to GEIS' Genie E-mail service will merge into a consolidated market for electronic commerce.

Sixty-five percent of GEIS' EDI and electronic commerce sales are, according to Mr. Crane, focused on specific trading communities. These communities are: computer manufacturing and distribution, petroleum, banking, retail, automotive, trade and transportation, health care, and publishing. In Europe, they are consumer electronics, retail, white goods, banking and trade and transportation. Some countries have specific vertical focuses such as Germany with its large trading communities in chemicals and automotive manufacturing. In the Asia-Pacific region, GEIS has a number of trade- and transportation-related projects (port communities, customs authorities, shipping lines).

c. Products and Services

Below are descriptions of GEIS' EDI and messaging products and services that are relevant to a discussion of open systems and electronic commerce. For a more exhaustive and detailed look at GEIS' line of products, see INPUT's report, EDI Vendor Profiles and Competitive Analysis.

EDI*Transit: A key product that reflects GEIS' embracing UNIX-based EDI translation. The product is designed to be upgradable over a series of Unix platforms (from IBM's RS6000 to Hewlett-Packard 9000).

EDI*Express and other network services: EDI*Express is GEIS' network service offering. It is being enhanced by GEIS upgrading the network (GEIS owns some telecommunication lines and nodes in large cities). Based on a client/server architecture, the network will distribute processing capabilities, data bases, EDI-server, and other services throughout the network

Business Talk and the Integrated Message Engine: Business Talk is GEIS' offering to corporations to handle all intercompany electronic communications through a single workstation interface. From the workstation, the user can send EDI, E-mail and other files to its trading partners. Business Talk is finding some success in retail and manufacturing companies.

GEIS is planning a major upgrade to Business Talk: called the Integrated Messaging Engine.

The first version of the integrated messaging engine is due out by the end of 1993. It builds on top of GEIS' current BusinessTalk product that incorporates E-mail, bulletin boards, text data bases, EDI, special applications (such as sales force automation, or trading community-specific applications), X.500 directories and X.400 messaging capability.

BusinessTalk today, except for some of the EDI translation, is almost entirely delivered by a single GEIS data center (two in the U.S. one in Europe). Using a piece of software that has communications and interface functions, the user dials the GEIS host and invokes the various services.

In the future, GEIS wants a much of the functionality off-loaded either onto the customer site or on a local GEIS network node. GEIS intends to build its messaging engine into existing LAN E-mail packages (such as cc:Mail, Network Courier, and 3+Mail), into host-based mail systems (PROFS, DISOSS, DEC), to interface with facsimile machines, to have a forms capability, spellchecker, workflow capabilities, APIs ready to link to specific applications, security features, and automated support (help menus),

GEIS is taking an object-oriented programming approach that allows its software to encapsulate other software and technology. Currently, GEIS has encapsulated 5 pieces of third-party software. It will eventually encapsulate 20 pieces when its integrated messaging engine is finished in two years.

By the end of this year, GEIS wants to have a product that will incorporate EDI, E-mail and an interface that allows for interactive (real time) exchange with a network data base or bulletin board. Additionally, the product will allow for a directory service that will be distributed and, therefore, have some kind of synchronization involved (to keep multiple and dispersed directories to have consistent data). Also, by the end of the year, the product will allow for local-area networks to interconnect via GEIS' network.

In 1994, GEIS wants to incorporate workflow, multimedia messaging, and extensive client/server capabilities to allow for distributed data bases and distributed processing (including EDI processing). In 1995, the product is expected to incorporate "intelligent user agents" that route, filter and process messages automatically.

d. Key Issues

- GE has done an exemplary job of putting together alliances and OEM agreements with technology vendors so that it can take care of the (potentially) more profitable job of selling solutions to users.

- GEIS' technology platform strategy is fully embracing open systems. How effectively GEIS will be able to implement its vision will determine its success.

- GEIS is both hindered and served by being the IS department of one of the largest corporations in the world. It has a guaranteed customer (60% of its revenues are captive —from other GE units). But this largesse can make it less responsive to non-GE markets compared with smaller, single-product companies.

6. Premenos

1000 Burnett Ave.
Suite 200
Concord, CA 94520
510-602-2000

Revenue: $12 million (INPUT estimate for 1992)
Chief Contact: Elizabeth Hudson, Director of Marketing

a. Company Background

Premenos currently markets and supports electronic messaging software products for midrange computers, including EDI software for IBM A/400, RS/6000, System/38, System/36, HP 9000 systems, and electronic mail software for IBM AS/400 systems.

The company was founded in 1978 as ACS, Inc. and developed software products for apparel manufacturers. After divesting itself of some of its apparel related products, the company settled on the name of Premenos, in 1992.

b. Strategy

Premenos is the leading provider of EDI software to the AS/400 market place. It enjoys a strong relationship with Advantis, getting its start as an EDI software vendor by building software that Advantis (then operating as IBM Information Network) resold under its own label. The relationship continues today, although Advantis does not use its label but sells the Premenos product to customers.

Premenos' EDI/e product (more details below) is a key product in bringing open systems to companies that want to establish EDI and electronic commerce systems. Premenos wants to serve customers across industries who use midrange platforms.

c. Products and Services

Premenos offers EDI translation and data communications products for midrange systems.

EDI/400: is translation software for the AS/400. Prices range from $6,000 to $28,000 (tier pricing based on computer model)

EDI/e: is a patented, built-in programming language that allows users to write custom translation programs. EDI/e is written for UNIX environments and makes full use of client/server architecture. It runs on IBM RS/ 6000s and HP 9000s. It is priced from $10,000 to $60,000, based on the number of "document relationships" of the customer.

EDI/36: for the IBM System 36 and priced at $5,700

EDI/38: for the IBM System 38 and priced at $9,000

QMAIL: is an E-mail software product that runs in an AS/400 environment. It is priced from $1,500 to $10,000 based on the number of users.

d. Key Issues

• Good technology and visionary new products (esp. EDI/e and Q-mail)

• Solid relationship with IBM

• Its targeted marketplace—the AS/400 and System 3X markets—is one of the fastest growing EDI/electronic commerce software markets as a result of rightsizing.

- To maintain its leadership as the premier midrange, EDI software provider will require constant vigilance because Premenos faces stiff competition from Sterling Software, Blue Rainbow, Texas Instruments, ABC, and SPS.

7. St. Paul Software

754 Transfer Road
St. Paul, MN 55114
612-641-0963

Revenue: $2.5 million (projected 1993)
Chief Contact: Gary Andersen, President and CEO

a. Company Background

St. Paul Software (SPS), founded in 1981, is a full-service supplier of electronic data interchange (EDI) products and services. It markets application software products, processing, and associated support services for EDI and electronic data collection (bar code reading and printing) to the manufacturing, distribution, and retail industries and government agencies.

b. Strategy and Markets Served

SPS has a large customer base in the railroad industry, where SPS got its start in 1985 when it developed a custom system for a supplier to Burlington Northern Railroad. Since then, SPS has been contracted to replace the Railinc PC software for Railinc customers. SPS has customers across industries and supports clients in the U.S. and provides international services through key strategic alliances on a worldwide basis. Key areas include Europe (Etrinell and Bull), Pacific Rim (Control Data Asia — Korea, Taiwan, Hong Kong, Singapore, Malaysia, Thailand and Mainland China), and others (Israel, Canada and Mexico). Most recent alliances are in South Africa (Perseus) and Chile (Com Center). Customers range from large corporate hubs (such as AT&T, United HealthCare Corporation, Tootsie Roll, Macklanburg-Duncan, McClellan AFB, etc.) to their low volume trading partners.

SPS was one of the first EDI software vendors to offer a UNIX-based package. It is aggressively pursuing and has been successful in selling a UNIX EDI solution. Its chief rivals in the UNIX arena are American Business Computer and Premenos.

SPS has been dogged by limited capital resources. Since 1992, however, it has received some private placements that should allow it to develop and improve its technology.

Despite its small size, SPS has pioneered new technologies and service niches. UNIX software, fax and voice integration with EDI software, mapping and barcode integration, and the service bureau are examples of SPS' innovations that have served it well. This track record should be advanced as SPS receives capital injections.

c. Products and Services:

Approximately 45-50% of the company's revenue is derived from EDI software. The remaining revenue is derived from professional services, maintenance and EDI Data Center processing services.

Interconn—a full-featured DOS-based EDI translation software package that balances the need for full EDI capability with a cost-effective PC-based solution. The cost is $1,995 plus $399 for annual maintenance.

EDI-entry—a low-cost DOS-based EDI translation software package designed for the smaller trading partners (the "spokes") of a central, large ("hub") account. Includes network services, remote support and is fully upgradeable. The cost is $595 for one trading partner and $895 for two trading partners.

EDI*Tran—high-performance EDI translation software package for all major UNIX and PC-based platforms. Designed for integration into a client/server EDI environment and provides extremely flexible mapping capabilities. It is priced according to CPU.

DOS	$2,700
Class A	$4,000
Class B	$6,250
Class C	$9,500
Class D	$11,250
Class E	$16,500

Note: Classes are determined by processor size, memory and overall thoughput of the UNIX machine.

Currently supports all major UNIX and PC-based platforms including BULL, Control Data, DEC ULTREX, Hewlett-Packard, IBM RS/6000, MIPS, Motorola, NCR, Pyramid, Sequent, Sequoia, Sun, Tandem, Texas Instruments and Unisys.

EDI*map—a CASE-based interactive mapping tool that simplifies the process of mapping EDI documents directly into applications, helping provide a seamless interface. Prices range from $2,000 to $5,000.

EDI*exec—is a date/time and event-driven EDI scheduling tool. De-signed to help EDI users control the EDI process flow and schedule EDI activities whether simple or complex. Prices range from $1,000 to $3,000.

Auto-ID— introduced in 1989, is an option that permits the scanning of shipping labels as shipments are being loaded. Auto-ID automatically generates ANSI X12 Advance Ship Manifests. Pricing varies depending on options.

SPS Data Center—An EDI service bureau which provides FAX-to-EDI conversion capabilities as well as automated, completely unattended EDI-to-FAX broadcast services. It also provides network services and hub roll out programs with EDI*entry and EDI trading partner conferences. In addition, the SPS Data Center offer translation services, crisis intervention and other custom services. SPS is currently performing EDI-to-FAX services for one of the major EDI value-added networks.

Other services—SPS offers other services including systems integration, trading partner workshops, product training, transaction set mapping, educational seminars, installation, custom integration, hotline technical support, product training, consulting and barcode integration.

d. Key Issues:

SPS has solid technology and innovates new products very well despite being limited financially.

It is doing well in developing alliances in the U.S. and throughout the world.

8. Sterling Software

Revenue: $259 million (FY Sept. 1992)
Chief Contact: Paul Olsen, President

a. Company Background

Sterling Software, headquartered in Dallas, TX, is a major worldwide supplier of software products and services in selected niches within three markets: systems software, electronic data interchange/electronic com-merce, and federal government professional services. The company has three operating groups corresponding to these three focuses. The groups act autonomously. The EDI/Electronic Commerce group is headquartered in Columbus, OH, and generated $57 million in 1992.

Sterling's strategy is to expand its existing businesses through internal growth and complementary product or company acquisitions. During the first half of 1993, Sterling acquired Systems Center, Inc. (Reston, VA) a major supplier of systems software products worldwide. The $185 million valued transaction brings a new revenue stream to the corporation of

approximately $130 million. The major synergies of this acquisition are most closely felt with Sterling's Systems software division. However, Systems Center has an extensive global sales and service network which Sterling had long desired. Thus, the Systems Center acquisition brings a worldwide distribution channel to Sterling which will enhance its EDI/ Electronic Commerce business as well. The acquisition has led to a corporatewide streamlining of job functions with redundancies eliminated primarily among the EDI and Systems divisions.

b. Strategy

In the fourth quarter of 1992, the EDI Group of Sterling Software announced that it was expanding beyond offering EDI software and services to provide "Electronic Commerce" products and services. The significant new vision outlined a strategic growth path to move from being a largely U.S.-focused EDI vendor to becoming a global "electronic commerce" vendor over the next five years.

Sterling is explicitly stating that they want to accelerate their international growth, strengthen their focus on software and evolve toward electronic commerce.

Sterling defines "electronic commerce" as "doing business electronically."

Sterling identifies changing customer needs as impetus to move to a more comprehensive product/service offering: high level forces include the move by users of forming strategic relationships with suppliers and customers, the globalization of business (sourcing and selling products internationally), the need to reduce costs; lower level customer changes include moving from batch to real-time EDI transmissions, the use of structured (EDI) along with unstructured (file transfer, E-mail) data transmissions, the use of X.400 to send files.

The result is a complete re-engineering of business: both internal to single companies and industrywide as whole value chains change form and composition (see article, front page).

Sterling wants to respond to this massive sea-change brought on by information services and technologies. It believes that it is one of the few companies that has the expertise, the product set, the customer base, and the resources that can build the new electronic environment in which business is beginning to operate.

Sterling distinguishes four main kinds of products and services that comprise its electronic commerce solution set:

- *Communication services*—includes such network services as EDI, E-mail, file transfer, and enhanced facsimile. Sterling expects to offer E-mail services this year. Sterling will not offer voice networks or virtual data networks.

- *Enabling software*—includes EDI management software, E-mail work-stations (to come in 1993), X.400 software, security software and monitoring software (such as its recently released ViewPoint package, that manages/logs EDI system activities. Sterling will not develop end-user applications. For tying into applications, it will continue to rely on alliances with application software vendors such as American Software (Atlanta, GA) or reseller agreements such as the one with Information Access Inc. (Cleveland, OH) for the food brokerage community.

- *Value-added shared applications*—these are EDI-enabled applications that a community of trading partner companies would use. They include data base services (such as Sterling's MarketQuest product), shipment tracking, RFP/bid award bulletin boards, and others. Sterling will not offer custom applications for individual companies.

- *Closely related professional services*—these include EDI education, mapping services, and implementation services but not systems integration or programming services.

In the near term (1993 and 1994), Sterling intends to roll out an X.400 messaging service through its switching center and complement it with workstation E-mail and file management software. It will offer the EDI-enabled applications of electronic payments and bid-award clipping services for the grocery and pharmaceutical industries.

It has assembled task forces to work with clients and develop products and strategy in the areas of: financial EDI, outsourcing and future software products.

Last year, the EDI Group reorganized, purchased another EDI company (a software vendor in the U.K. — continuing its ongoing acquisition strategy), continued to bring in software groups and expertise from other parts of corporate Sterling (especially in the areas of banking, finance and security), hired a number of key EDI executives away from competitors (including **GE Information Services** and **AT&T**), and, at the end of the year, sketched the outlines of a new strategic vision: to expand beyond being a largely U.S.-based EDI vendor and becoming a global electronic commerce vendor.

Sterling's EDI Group generated $57 million in revenues for 1992, according to the recently released Form 10-K. The company has 4,100 installations of its EDI software products and 5,500 network customers.

c. Products and Services

Sterling Software's EDI Group offers a range of software products and network services. For a full description, see INPUT's report, EDI Vendor Profiles and Competitive Analysis. Below are brief descriptions of products and services that are relevant to the EDI Group's open systems and electronic commerce strategy.

Gentran: Sterling's EDI translation software product. It has several versions depending on the target computer platform. It runs on:

* IBM 30XX, 42XX, 9370 under MVS and DO"S/VSE   from $37,000
* DEC VAX under VMS   from $7,500
* IBM S/3X   from $6,000
* AS/400   from $7,500
* IBM PC and PS/2 families and compatibles   from $1,295
* UNIX   from $7,500

Commerce Connection - a multipurpose, customer-workstation interface to Sterling's EDI network. Allows users to conduct many kinds of network communications E-mail, EDI, file transfer and distributed data bases. It is delivered to the customer in the form of (1) a software package that runs on an individual's workstation and, in turn, intefaces with (2) network services that include E-mail boxes, network administration services, catalog/library services, and file-transfer services. A key service is library services. Through library services, EDI trading partners can send reference files to their trading partners. Using this facility, a hub company, for example, could disseminate new EDI transaction set templates, E-mail addresses, product catalogs and product listings, policies and procedures, and otherwise administer its electronic connections with its trading partners.

Commerce Connection has a graphical user interface, runs under MS-DOS. A Windows and UNIX version is in the works. Price is $240 per user.

Vector - Sterling's set of financial and banking software products, including an EDI/EFT payments module. The module allows banks to send and receive EDI/EFT transmissions on behalf of their corporate customers.

Ordernet - Sterling's EDI network. Services on Ordernet range from simple store and forward, to file translation, EDI syntax checking and error correction, EDI-to-fax conversion, various protocol conversion services, internetworking to other EDI networks, MarketQuest (an EDI data traffic monitoring service), and others. It also offers its network in an array of pricing arrangements: from those that are customized to specific trading communities to a standard fee structure for any company.

Educational Services - Sterling has experienced great success and has been very aggressive in providing EDI education and training. Its EDI Center (located in Columbus, OH) has trained over 15,000 people from over 10,000 organizations. It offers on-site training and video courses as well.

d. Key Issues

Sterling has been the bellweather EDI company for the past 10 years. While it shares the spotlight with the other major EDI vendors (GE Information Services and Advantis/IBM), it stands alone in that it is the only major EDI vendor who has consistently remained profitable. The EDI Group's expansion internationally and its received benefits from other Sterling divisions should help propel it to new market and product vistas. Nevertheless, Sterling must guard against the problem of growing too large: becoming inwardly focused. While it has been instrumental in defining EDI and Electronic Commerce for the world, it could potentially be displaced by companies who are better positioned to sell to mass markets.

9. Texas Instruments Incorporated

6500 Chase Oaks Blvd.
Plano, TX 75023

Revenue: $7.4 billion (FY end December 1992)
Chief Contact: Jeffrey Sturrock, Manager, EDI Strategy Development, 214-575-2903

a. Company Background

Texas Instruments Incorporated is engaged in the development, manufacture and sale of a variety of products in the electrical and electronics industry for industrial, government and consumer markets. These products consist of semiconductors, defense electronics systems, software productivity tools, computers and peripheral products, custom engineering and manufacturing services, electrical controls, metallurgical materials, and consumer electronics products. TI's business is based principally on its broad semiconductor technology and application of this technology to selected electronic end-equipment markets. TI has sales or manufacturing operations in more than 30 countries.

b. Strategy

TI's strategy in the information technology market is to concentrate on software products and services. It concentrates on hardware only where it has a sustainable competitive advantage (during 1992, and it sold its minicomputer systems and service operations to Hewlett-Packard). TI expects to create a billion dollar business in software and services by the mid-nineties.

TI's software and services strategy is to (1) target fortune 100 companies, (2) bring to these companies a quantum re-engineering of their mission-critical information systems such that the company will have a significant competitive advantage in its industry (in other words develop systems that are comparable in impact to the impact of computer-reservation systems in the airline industry), and (3) develop and expand a product set of CASE and application software that will allow TI professionals to build these systems for its customers.

Central to TI's information technology strategy is its Information Engineering Facility (IEF) product. It is a leading computer-aided software engineering (CASE) tool on the market today with 650 customers around the world using it (including American Express and EDS). TI developed a higher-level product to its IEF called the Business Design Facility (BDF), which is a workstation-based software tool that helps customers re-engineer their business processes. Data resulting from this business process analysis can automatically be fed to the IEF.

Within the Information Technology division of TI is the Enterprise Systems Business, which TI created in 1991. ESB offers software and services that bring a total solution to a corporate customer. ESB management information products are mission-critical, strategic business systems that are CASE-based and built on re-engineered business processes.

c. Products and Services

The Enterprise Systems Business of TI's Information Technology division markets TI's EDI and electronic commerce products. The origins of these products are TI's own internally developed systems.

The products are:

- Enterprise Procurement Systems
- Electronic Data Interchange
- Order Entry Systems
- Planning Systems
- Manufacturing Automation Systems
- Concurrent Engineering Design Software

In addition, TI's Enterprise Systems Business offers the following services:

- Systems Integration Consulting
- Turnkey Installations
- Custom Automation Designs
- CIM Planning and Consulting
- Concurrent Engineering Consulting

In more detail, the EDI products consist of:

Mainframe EDI software

- Gateway: EDI communications, an MVS store-and-forward processing facility. (Originally priced in 1992 around $70,000)

- Translator: EDI translation, artificial intelligence-based translation software (also originally priced around $70,000)

Related tools:

- Workbench: a PC-based mapping tool

- Management System: set-up, tracking and monitoring for all activity in a trading partner relationship

- Test Facility: test feed verification and error correction.

UNIX and Desktop EDI

These EDI software packages offer the same general functions of the mainframe packages described above but are designed to run in UNIX and Microsoft Windows' environments. These are being released in mid-1993. Prices are to be determined.

TI's IEF allows users to designate target code, including UNIX. Thus, once a system has been designed, users merely select that it generate UNIX code to run in.

d. Key Issues:

Texas Instruments' could position itself to be the software vendor at the nexus of open systems and electronic commerce. Its CASE, IEF, BDF offering along with its strategic vision in bringing customers highly competitive mission-critical information systems is a very attractive market offer. It appears that TI has the software and technical expertise as well as the experience (because its tools and applications were developed first for internal purposes) to deliver on its promises. The issue is whether TI can mobilize its resources effectively both in sales and marketing and in quickly satisfying its customers. Ongoing personnel turnover within the information technology division dampens the prospects for TI to be as nimble a market player as it could and needs to be.

10. TSI International

45 Danbury Rd.
Wilton, CT 06897
203-761-8600

Revenue: 1992 revenue $16 million (INPUT estimate)
Chief Contact: Constance Galley, President and CEO

a. Company Background

TSI International develops and markets software products for IBM mainframes and PCs with a special focus on solution for the delivery of data to production systems. TSI addresses the market needs of traditional (manual) data entry as well as EDI. The company is an IBM Business Partner.

Founded in 1967, TSI successfully developed and marketed systems software products in the IBM mainframe software market, culminating in the 1978 introduction of KEY/MASTER, which grew over the following years to become the world's leading data input software system.

In 1990, after receiving private-placed capital, TSI launched its own mainframe translation software product, Trading Partner. During 1990 TSI also acquired the license and customer base to TranSettlement's TranSlate EDI software for IBM mainframes and acquired the PC-translator company Foretell Corporation (from JWP, Inc.).

In 1992, TSI launched its kit series of PC based EDI software, which are translation software packages that have been preconfigured for specific trading communities (e.g. Wal-Mart, All-State, etc.).

In 1993, TSI launched Mercator, a general purpose translation product capable of translating data arranged in any file format into any other file format (including but not limited to standardized file formats). Mercator is object-oriented and runs under Windows.

b. Strategy

TSI is targeting the EDI mass market. It is cognizant that there is a second tier of EDI user: the suppliers of the principal hub companies. These suppliers number in the hundreds of thousands, not the tens of thousands, the current number of EDI users today.

In line with targeting the mass market, TSI has adopted a mass market price point for its PC software: under $500. Also, its EDI Kits products are aimed at allowing small users to come up quickly in adopting EDI. A Kit is translation software that comes pre packaged with the transaction sets used by a particular hub company (for example, Wal-Mart, All-State Insurance, etc.).

TSI is aggressively pursuing the hub-spoke strategy. It has won large contracts with hub companies, establishing deals where the hub's suppliers are recommended to purchase TSI's PC software. TSI has targeted large Fortune 1000 companies and government agencies to sell its product to. TSI also supplies hub companies with sophisticated mainframe size EDI translation software with its product, Trading Partner.

c. Products and Services

Trading Partner - a high-performance, mainframe-based EDI management software package. Includes translation functions, communications for direct ties to trading partners, applications gateway (for importing and exporting data from applications), on-line mapping facility, and various checking and reporting functions. Priced from $30,000 to $200,000.

Trading Partner PC - EDI translation software including all asynchronous network connections. Requires a -386 (or larger) computer, Windows and a mouse. Priced at $495.

EDI Kits - includes prepackaged solutions for a particular trading partner. It contains all the transaction sets and reports required for that trading partner and may contain document turnarounds to reduce data entry. Priced at $249 to $395 each.

Standards collection - A standards collection consists of all transaction sets or messages in our inventory for multiple versions and releases. The X12 set, for example, includes versions 2002 through 3020. Collections are available for ASC X12, EDIFACT, and TRADACOMS. Priced at $295.

Mercator - is a mapping tool that uses a point-and-click approach to mapping data from one file format to another. Runs under Windows, is object-oriented by design and so, therefore, eliminates writing code (programming) as a way map files together. Has uses beyond merely EDI applications. Mercator is a truly generic mapping tool and can map any file to any other file (not just standard EDI files). Also, Mercator acts in a run-time mode, so that it is translation software in addition to a mapper. One Mercator customer describes it as a "CASE tool for EDI mapping." Pricing has not been determined at this time.

TSI also sells products in the data acquisition and data input arena. For more information on these, see INPUT's report, EDI Vendor Profiles and Competitive Analysis.

d. Key Issues

TSI's "mass market" approach (including the under-$500 price point for EDI software) could be very successful.

Mercator could become TSI's principal product. Its wide functionality makes it attractive to many information processing needs, not just file-format translation. Mercator could easily be incorporated to other system software and messaging gateway/engine products. TSI could conceivably become an OEM to several software vendors.

C

Profiles of System Software Vendors

1. Microsoft

One Microsoft Way
Redmond, WA 98052-6399
206-882-8080

Revenue: $2.7 billion (1992)
Chief Contact: Richard Tait, Director of Solutions Strategy

a. Company Background

Founded in 1975 and incorporated in 1981, Microsoft currently designs, manufactures, markets and supports microcomputer systems and applications software products and related books, hardware and multi media products. The company's business strategy focuses on developing a wide range of microcomputer software products marketed through multiple distribution channels. Microsoft Windows is the flagship of the company's current product line, which extends into word processing, spreadsheets, data bases, programming language, planning packages, graphics and multimedia. In the second quarter of 1993, the company formally introduced its Windows NT client/server operating system and announced Windows at Work, its plan to create a totally integrated, virtually paperless office environment.

b. Strategy

Microsoft's answer and approach to client/server computing is Windows and NT. These are not open systems in the sense of being non proprietary. They are open in that third-party vendors build software that runs in these environments.

The target market for NT is companies with large networks of PCs, engineering organizations, government agencies and anyone who can benefit from NT's sophisticated security features and high-level communication abilities. Microsoft is expected to sell only 300,000 to 350,000 copies of Windows NT by the end of 1993.

NT won't run on the majority of PCs today. It requires at least 12 mega-
bytes of RAM, though Microsoft recommends a minimum of 16 mega-
bytes. (Fewer than 1% of all PCs have even 8 megabytes of RAM in-
stalled.) Even Dwayne Walker, Microsoft's director for Windows NT and
networking products says "It'll overwhelm the average user." Neverthe-
less, Microsoft estimates that there will be more applications for NT in
five years than for any other system.

c. Products and Services

Windows NT: Formally introduced in May 1993, Windows NT replaces
LAN Manager as the cornerstone of Microsoft's client/server strategy.
Microsoft took the technology of LAN Manager and expanded and embel-
lished it to create the all-encompassing functionality of NT. The platforms,
architectures and networking systems which NT supports include: MS-
DOS, Macintosh, UNIX, POSIX, OS/2, 16- and 32-bit Windows applica-
tions, Intel x86 and Pentium, MIPS R4x00, DEC Alpha AXP, TCP/IP,
IPS/SPX, NetWare, Banyan VINES, DEC Pathworks, IBM LAN Server,
SNA and AppleTalk.

Over 80,000 users, including 65,000 software development kit (SDK)
users and 15,000 beta sites, participated in the pre release testing of NT.
Microsoft currently estimates that NT SDKs are outselling 3.1 SDKs on a
monthly basis, although the company would not provide exact figures.

The following are key components that will be part of Windows NT and
the server version Windows NT Advanced Server systems software:

* A powerful, systems query language-(SQL) based relational data base
  management system for on-line transaction processing

* System network architecture (SNA) and enterprisewide connectivity for
  integrating LAN-based systems and users with existing or future server-
  based applications and management tools

* Connectivity between mainframe data bases, clients and servers, and
  peer-to-peer to provide data access to applications subsystems and
  desktop-resident applications

* The capability to interconnect numerous LANs transparently through the
  network systems and architectures listed earlier for the purpose of
  supporting intra-LAN communications and single LAN administration

* Tools for adapting or developing applications subsystems for the client/
  server model, in addition to LAN-based applications for aiding user
  work group productivity, and may include E-mail, scheduling, word
  processing and other office automation and productivity software appli-
  cations.

Other Microsoft client/server products:

LAN Manager
SQL Server
DCA/Microsoft Communications Server
Database Gateway
Windows/Windows NT

Enterprise Message Server

2. Novell, Inc.

122 East 1700 South
Provo, UT 84606-6194
801-429-7000

Revenue: FY 1992 (Oct.) $933.4 million
Chief Contact:

a. Company Background

Over the last ten years, Novell has emerged as the world leader in network operating systems (NOS) for desktop computers, with over two million client/server local area networks (LANs) installed, supporting over 20 million desktop computers. Over the past two years, Novel has acquired Digital Research, Inc. and, in June 1993, UNIX Systems Labs that was divested of AT&T. Early in its corporate life, Novell was predominantly a hardware company but it has successfully undergone the transition of being a software company and, in particular, an operating systems company.

b. Strategy

Novell's strategy today is to build and deliver enterprisewide computing products and networks. Large corporations need sophisticated backbone networks (or want to replace the proprietary ones already installed) to link departmental local-area networks. As such, Novell must now sell into information systems groups of large companies. Novell has been ingenious in its use of value-added resellers who resell Novell software into vertical and geographic-specific markets. One hundred percent of Novell's sales are through its 10,000+ VARs.

c. Products and Services

The cornerstone of Novell's product line (and client/server strategy) is its network operating system, NetWare. In March, 1993, it launched version 4.0 of NetWare.

NetWare 4.0 - a network operating system that delivers advanced network services for large enterprisewide networks. NetWare 4.0 provides an integration platform letting customers connect their diverse computing environments into a cohesive network computing system, making the network easier to use, manage and administrate.

Suggested U.S. list pricing:

5-user	$1,395
10-user	$3,195
100-user	$8,795
1,000-user	$47,995

(other price points are available; check with Novell)

Distinguishing version 4.0 from previous versions of NetWare are:

NetWare Directory Service (NDS) - NDS is a global, distributed, replicated data base built into NetWare 4.0 that maintains names and information for every object on the entire network including users, files and services (e.g. printers, application software modules, etc.). Patterned after the X.500 international directory standard, NDS allows customers to log in once to the network directory where all objects, services, and user rights and privileges are stored. Access to any resource or user on the network is done through NDS. NDS makes connections transparent to users who do not need to see the complexities of a network or memorize multiple passwords. Network administration is also much easier because supervision of users and resources is centralized through NDS. NDS integrates a diverse network of users and resources into a single, easy to understand environment.

NetWare 4.0 has other features that include: memory protection/management (giving memory protection and allowing network administrators to protect other server operations from a failing module), network management capabilities (using either SNMP or NetView application formats), enhanced security (using RSA encryption algorithms), routing and data compression enhancements, CD-ROM server support, graphical utilities, on-line documentation, imaging storage services and other storage management services.

Other products, services and product features relevant to electronic commerce from Novell are:

The Novell Network Registry - Is a network administration service administered by Novell. Customers contact the Registry to reserve an organization name, or a range of addresses, or both. Once an organization name is selected by the user, it is recorded by the Registry administrator. A unique range of addresses is allocated by the Registry to match the customer's

needs. Working with assigned network names and numbers assures customers that they will have a unique set of network identifiers, enabling organizations to have reliable communications among themselves throughout the world. Registration fees start at $100.00 and range higher depending on the number of IPX addresses requested.

Electronic Software Licensing services for NetWare - Electronic software licensing (ESL) builds upon traditional contractual licensing options by automating the process and providing customers with electronic tools that make it possible to efficiently manage software licenses on a networkwide basis. ESL allows network administrators to know what software is out on the network, how it is being used, which users are using it; it allows the administrator to upgrade software and to restrict the usage of software by use of passwords.

ESL is a Network Loadable Module (NLM—Novell's term for software that can be incorporated into NetWare networks) that will operate as a "license server" on NetWare networks. It will manage all activities relating to software licenses such as the number of copies of a given piece of software that is in use relative to the number of licenses that have been purchased. In one possible licensing scenario when all available licenses are in use, the product can be configured to create a waiting list and allows users to launch the software when a license becomes available. Other kinds of licensing scenarios include: node-locked licensing (the application can only be launched from a particular desktop), demo licensing (a fully functioning piece of software with time usage limitations set up) and others.

Novell is making developer tools that provide access to ESL services so that developers can build NetWare Loadable (software) Modules (NLMs) that can be bought and sold automatically within a NetWare network.

Pricing for ESL has not been set.

d. Key Issues

Novell, with its large and growing installed base of NetWare users and its incorporation of UNIX into its products, has a strong position on the server/network side of client/server. Microsoft, with its Windows and desktop applications franchise, is in the stronger position on the client side of client/server.

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